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A REVISION OF THE EAST AFRICAN NASUTITERMITINAE (ISOPTERA)

W. A. SANDS

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BY

W. A. SANDS

Xul

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A REVISION OF THE EAST AFRICAN NASUTITERMITINAE (ISOPTERA)

By W. A. SANDS, M.Sc., F.R.E.S.

Colonial Termite Research Unit.

THIS paper is one of a series of taxonomic studies on East African termites, based on the work of the Colonial Termite Research Unit. It concerns the subfamily Nasutitermitinae, the soldiers of which are characterized by having the frons and vertex of the head produced into a *nasus* or nose from which a defensive fluid is secreted, instead of having the well developed mandibles common to termite soldiers in general.

For the purposes of this work East Africa is taken to include Kenya, Uganda, Tanganyika, Zanzibar, Nyasaland, Ruanda Urundi, and the north eastern portion of Northern Rhodesia. The collections of Nasutitermitinae from this area are considered sufficiently detailed to permit a degree of revision of the group as it occurs there. Two species are reduced to synonyms, and several have been found to be more variable than was anticipated in the original description. A number of castes previously unknown are described here, and keys to the species known to occur in East Africa have been prepared, differing in arrangement and contents from the keys provided by Sjöstedt (1926), in an attempt to utilize the additional information now available.

The Nasutitermitinae of this area fall into two distinct faunistic groups which do not overlap to any large extent. The greater part of the area is occupied by the true East African fauna, substantially similar to that covering the rest of Africa south of the Equator, excluding the Congo forest. In Uganda north of the Equator, the second group of species is found. This region is the extreme eastward extension of the Guinean Zone, and as such has close affinities with West Africa, Central Africa north of the Tropical Rain Forest, and the Southern Sudan.

The following eighteen species are dealt with here :

Nasutitermes chapini Emerson.
Nasutitermes incurvus (Sjöstedt).
Nasutitermes infuscatus (Sjöstedt).
Nasutitermes kempae Harris.
Nasutitermes torquatus (Sjöstedt).
Coarctotermes brunneus Noirot.
Coarctotermes coarctatus (Sjöstedt).
Grallatotermes africanus Harris.

Trinervitermes auriterrae Sjöstedt.
Trinervitermes bettonianus (Sjöstedt).
Trinervitermes carbonarius Sjöstedt.
Trinervitermes crassinasus (Sjöstedt).
Trinervitermes dispar (Sjöstedt).
Trinervitermes ebenerianus Sjöstedt.
Trinervitermes gratiosus (Sjöstedt).
Trinervitermes lutzi Emerson.
Trinervitermes oeconomus (Trägårdh).
Trinervitermes rapulum (Sjöstedt)

Two species are regarded as synomyms :
Nasutitermes usambarensis (Sjöstedt), now included in *N. infuscatus.*
Trinervitermes segelli (Sjöstedt), now included in *T. bettonianus.*

Tanganyika records of *Trinervitermes gemellus* (Sjöstedt) are included in *T. dispar.*

A note on variation

A great deal of variation has been found in this group, particularly in the soldier caste, as a result of which many of the commonly used taxonomic characters are of doubtful value in distinguishing species. In some cases it is impossible to allocate individual soldiers to a species with any certainty. However, where the number of specimens of this caste is sufficient to establish the range of variation, it is usually possible to separate even the more closely related forms.

Variation in the soldier caste follows a basically similar pattern within each genus. The nose may vary in thickness, length, shape, and in the angle at which it projects from the main part of the head. A variation of 25 degrees has been found to occur in *T. dispar* (Sjöstedt), but most species fall short of this. The rest of the head capsule may vary considerably in size, and sometimes also in outline in plan view. The antennae frequently vary with the size of the specimen, larger individuals having extra segments the relative proportions of which are also different. The pronotum often varies in the extent of emargination of its anterior border.

These remarks refer to the major soldier where two forms are present. The minor soldiers of *Trinervitermes* are variable to such an extent that it has been found impossible to separate the individual species except in the most widely divergent forms.

In the alate caste there is less variation than in the soldier, and it is more often variation in the size of the entire insect than in the proportion of different parts of the body. The size and relative proportions of the eyes and ocelli vary slightly in some species, as may do the width and length of the fontanelle. Variation in the number and proportions of the antennal segments occurs, but is less than in the soldier.

The alate caste is in most cases the more satisfactory means of identification, and a key is given to those species of which it is known.

Key to the Alates

Alates of the subfamily Nasutitermitinae, in East Africa, are distinguished by the following characters : labrum broader than long, apical third hyaline ; mandibles with apical tooth as long as or slightly longer than first marginal ; left mandible with straight or slightly sinuate cutting edge between first and third marginal teeth true second marginal tooth absent (few exceptions) ; eyes generally large, greatest diameter slightly longer up to twice as long as postclypeus ; fontanelle slit-like, usually bifurcate at anterior end (V, Y, T, or I-shaped), rarely approaching round or oval shape, seldom so small as to appear absent.

1. Head width across eyes not more than 1·40 mm., rarely over 1·36 ; if approaching 1·40, then eyes larger, exceeding 0·50 mm. 2
–. Head width across eyes not less than 1·40 mm. ; if as low as 1·40, then eyes smaller, under 0·50 mm. 6
2. Eyes 0·50 mm. diameter or greater . . . . . *Nasutitermes kempae* Harris
–. Eyes 0·45 mm. diameter or smaller 3
3. Postclypeus less than half as long as broad 4
–. Postclypeus at least half as long as broad 5
4. Hind tibia less than 1·65 mm. ; fore wing less than 12·0 mm. (Distribution ; Kenya to Nyasaland) . . . . *Nasutitermes infuscatus* (Sjöstedt)
–. Hind tibia over 1·65 mm. ; fore wing over 12·5 mm. (Distribution : Uganda, Congo) *Nasutitermes torquatus* (Sjöstedt)
5. Left mandible with deep notch in cutting edge between first and "second" marginal teeth, just distal to the latter . . . *Coarctotermes tenebricus* (Silvestri)
–. Left mandible with cutting edge between first and "second" marginal teeth entire, straight or slightly sinuate, but never notched . . *Coarctotermes coarctatus* (Sjöstedt)
6 Pronotum broad, rounded, rather flat, anterior lobe not distinctly raised, separated from the rest of the pronotum by a very weak groove. Head and pronotum very finely pubescent . . . . *Grallatotermes africanus* Harris
–. Anterior lobe raised, separated from rest of pronotum by marked change of contour and deep grooves. Head and pronotum coarsely pubescent 7
7. Head capsule as wide behind eyes as in front 8
–. Head capsule distinctly narrower behind eyes than in front 9
8. Postclypeus 4 times broader than long ; hind tibia 2·00 mm. or more ; head width 1·55–1·70 mm. . . . . *Nasutitermes incurvus* (Sjöstedt)
–. Postclypeus 2½–3 times broader than long ; hind tibia 1·70–1·80 mm. ; head width 1·35–1·50 mm. . . . . *Nasutitermes torquatus* (Sjöstedt)
9. Head width across eyes less than 1·50 mm. 10
–. Head width across eyes greater than 1·50 mm. 11
10. Fontanelle narrow Y-shaped in both sexes. Hind tibia less than 1·90 mm. *Trinervitermes dispar* (Sjöstedt)
—. Fontanelle short broad Y-shaped in female, slender Ų-shaped in male, margins often indistinct. Hind tibia usually over 1·90 mm. . . *Trinervitermes rapulum* (Sjöstedt) (Small specimens uncommon.)
11. Greatest diameter of eye less than 0·60 mm. (only a few over 0·56) 12
—. Diameter of eye over 0·61 mm. (most over 0·65 mm.) 14
12. Fontanelle with 3–4 stout bristles or spines surrounding and overlapping anterior end (Text-fig. 3, Q, R) ; posterior margin of postclypeus arched, slightly angular, not evenly rounded (Text-fig. 2E) . . . . *Trinervitermes lutzi* (Emerson)

—. Fontanelle without bristles or spines ; any setae present not larger than other head setae ; posterior margin of postclypeus evenly rounded 13
13. Fontanelle of female V or inverted A-shaped, arms slender, dilated terminally to form " serifs " ; males narrower, sometimes approach Y-shape. Head dark brown with 3 diverging pale streaks on vertex. Abdominal sternites with darker brown shaded areas around stigmata . . . *Trinervitermes bettonianus* (Sjöstedt).
—. Fontanelle of female Y-shaped, arms not slender, uniform in width ; males Ų-shaped ; without " serifs " in both sexes. Head yellow-brown without diverging pale steaks on vertex. Abdominal sternites without darker areas round stigmata *Trinervitermes rapulum* (Sjöstedt)
14. Antennae 15–16 segmented. Eye and ocellus 0·04–0·08 mm. apart, average 0·06 mm. Fore wing 21–24 mm. long. (Distribution : Kenya, Tanganyika, and Uganda south of the Equator) . . . . . *Trinervitermes gratiosus* (Sjöstedt)
—. Antennae 17 segmented. Eye and ocellus 0·02–0·04 mm. apart, average 0·03. Fore wing 17–20 mm. long. (Distribution : Uganda north of Equator, Guinean savannah zone) . . . . *Trinervitermes oeconomus* (Trägårdh)

Based on Sjöstedt's Morphotype queen, and other specimens from West Africa.

Key to the Soldiers

In the case of *Trinervitermes*, where there are two or more soldier forms present, this key refers only to the major soldier.

1. Head constricted behind antennae 2
—. Head not constricted behind antennae 5
2. Large species, head length 1·80 mm. or more . . *Grallatotermes africanus* Harris
—. Smaller species, up to 1·70 mm. long 3
3. Back of head distinctly to deeply sulcate in the middle line ; hind tibia under 1·00 mm. long . . . . *Coarctotermes brunneus* Noirot
—. Back of head evenly rounded, or at least entirely convex ; hind tibia over 1·00 mm. long 4
4. Antennae 13 segmented ; width of head usually greater than 0·65 mm. *Coarctotermes tenebricus* (Silvestri)
—. Antenna 12 segmented ; width of head usually less than 0·65 mm. *Coarctotermes coarctatus* (Sjöstedt)
5. One soldier form only present, mandibles usually with points 6
—. Two or more soldier forms present, mandibles without points 10
6. Nose, measured to hind margin of antennal pit, distinctly shorter than the rest of head capsule *Nasutitermes infuscatus* (Sjöstedt) and *Nasutitermes torquatus* (Sjöstedt)
—. Nose approximately as long or slightly longer than the rest of the head capsule . 7
7. Head distinctly swollen above line of nose, with definite change of contour at base of nose . . . . *Nasutitermes chapini* Emerson
—. Head profile straight or evenly concave, without marked changed of contour at base of nose 8
8. Head width 87–114% of hind tibia length (mean 98%) ; head profile straight or very slightly and evenly concave. (Distribution : Kenya to Nyasaland) *Nasutitermes kempae* Harris
—. Head width 73–93% of hind tibia length (mean 81%) ; head profile slightly to strongly and evenly concave or slightly sinuate. (Distribution : Uganda, Congo). 9
9. Nose broad at base, strongly and evenly tapered (angle 18–23 degrees) *Nasutitermes torquatus* (Sjöstedt)

–. Nose only weakly tapered or almost cylindrical (angle 10–15 degrees) *Nasutitermes incurvus* (Sjöstedt)

10 Antennae with 12 segments 11

—. Antennae with more than 12 segments 12

11. Nose broad at base, strongly and evenly tapered (angle 15–22 degrees) *Trinervitermes bettonianus* (Sjöstedt)

–. Nose only weakly tapered or almost cylindrical (angle 5–13 degrees)
Trinervitermes dispar (Sjöstedt), *T. rapulum* (Sjöstedt), and *T. lutzi* (Emerson) all uncommon with 12 segmented antennae, and difficult to distinguish in small specimens

12. Antennae with 13 segments 13

–. Antennae with 14 segments 19

13. Nose distinctly conical, strongly and evenly tapered to rather pointed tip . . 14

—. Nose weakly tapered, approximating to cylindrical, more rounded at tip . . 15

14. Head capsule from above evenly rounded, broad oval, almost circular, not noticeably tapered anteriorly, pronotum not emarginate. Distribution : Zambezi and lower Shire valleys . . . . *Trinervitermes crassinasus* (Sjöstedt)

—. Head capsule from above rarely evenly rounded, usually slightly angular, slightly tapered to front (or rear in some specimens). Pronotum often but not always somewhat emarginate. Distribution : Nyasaland apart from Lower Shire valley, Tanganyika, Kenya, and north-eastern Uganda. *Trinervitermes bettonianus* (Sjöstedt)

15. Fontanelle large, over 0·07 mm. in diameter, almost twice as large as any other species . . . . *Trinervitermes auriterrae* (Sjöstedt)

—. Fontanelle small, under 0·05 mm. in diameter 16

16. Hind tibia 1·50 mm. or less 17

—. Hind tibia over 1·50 mm. 18

17. Head usually distinctly wider than length of hind tibia (exceptions to this fairly common . . . . *Trinervitermes rapulum* (Sjöstedt)

—. Head capsule usually not wider than length of hind tibia (exceptions fairly common).
(*a*) slighly larger : L., 1·98–2·44 ; W., 1·14–1·39 ; T_3, 1·16–1·44 mm. *Trinervitermes lutzi* (Emerson)
(*b*) slightly smaller : L., 1·71–2·23 ; W., 0·93–1·36 ; T_3, 1·04–1·39 mm. *Trinervitermes dispar* (Sjöstedt)

18. Head capsule and nose, measured to hind margin of antennal pit, about equal in length, or nose slightly the longer. Distribution : West Afr., Uganda North of the Equator . . . . *Trinervitermes carbonarius* Sjöstedt

—. Head capsule about one eighth longer than nose. Distribution : Tanganyika, Kenya, and Uganda South of Equator . . . . . *Trinervitermes gratiosus* (Sjöstedt)

19. Hind tibia over 1·50 mm. in length 20

—. Hind tibia less than 1·50 mm. in length . . . . *Trinervitermes rapulum* (Sjöstedt)
(*T. dispar* (Sjöstedt) occasionally has 14 segmented antennae, and then comes out at this point in the key.)

20. Nose measured to hind margin of antennal pit as long as or longer than rest of head capsule . . . . *Trinervitermes carbonarius* (Sjöstedt)

—. Nose more or less shorter than head capsule 21

21. Head darker, ferruginous to dark chestnut brown, nose darker than head, to almost black. Distribution : Uganda, and Congo South of Equator, Tanganyika, Southern Kenya . . . . *Trinervitermes gratiosus* (Sjöstedt)

—. Head paler, yellow to yellow-brown, nose orange to chestnut brown. Distribution : Uganda North of Equator, and Guinean Savannah Zone 22

22. Head yellow, nose orange to ferruginous . . *Trinervitermes oeconomus* (Trägårdh)

—. Head yellow-brown, with darker shading, nose brown *Trinervitermes ebenerianus* Sjöstedt

NASUTITERMES Dudley

Nasutitermes chapini Emerson

(Text-fig. 4, A, B)

Nasutitermes (*Nasutitermes*) *chapini* Emerson, 1928, *Bull Amer. Mus. nat. Hist.*, **57** : 480–491, Belgian Congo ; Ngayu.

SOLDIER. Fourteen segmented antennae occur in larger specimens. Variation in size somewhat greater than was recorded by Emerson.

	mm.
Length of head	1·67–1·75
Width of head	1·07–1·11
Length of pronotum	0·22
Width of pronotum	0·50–0·54
Length of hind tibia	1·22–1·36

UGANDA : Ankole province, 1939 (*H. C. Johnstone*).

Nasutitermes incurvus (Sjöstedt)

(Text-figs. 1, A ; 3, A ; 4, C, D)

Eutermes (*Eutermes*) *incurvus* Sjöstedt, 1924, *Rev. zool. afr.* **12** : 41 ; Belgian Congo : Kunungu and Lukula.

Nasutitermes (*Nasutitermes*) *incurvus* (Sjöstedt) ; Emerson, 1928, *Bull. Amer. Mus. nat. Hist.*, **57** : 478.

IMAGO. Measurements of the ocellus, and its distance from the eye, are added to those given by Emerson.

	mm.
Width of head across eyes	1·55–1·70
Eye, greatest diameter	0·50–0·53
Ocellus	0·15 × 0·21
Ocellus to eye	0·09
Width of pronotum	1·33–1·43
Length of pronotum	0·72–0·83
Length of hind tibiae	2·00–20·7
Length of fore wing	11·5.12·5

SOLDIER. These fall well within the range of variation in size given by Emerson. The head profile from nose to vertex varies in its degree of concavity, with the result that some specimens are indistinguishable from *N. kempae* Harris. Confusion of the two is unlikely, since *N. kempae* occurs on the Kenya and Tanganyika coast, and in Nyasaland, and *N. incurvus* is a Uganda and Congo forest species. The alates are easily separated in these two species, *N. incurvus* having more prominent eyes and a much narrower postclypeus, and being generally larger than *N. kempae*.

The specimens listed below were identified from material compared with the type by Emerson (1928, Bequaert collection No. 166) and have not been compared with type directly.

UGANDA: Kyagwe, 1949 (*W. V. Harris*); Budongo Forest, 1939 (*C. C. Gowdey*); Namanwe, 1939 (*G. E. E. Hopkins*).

This species has been recorded from Uganda, across the Belgian Congo to the Cameroons.

Nasutitermes infuscatus (Sjöstedt)

(Text-figs. 1, B; 3, B; 4, E, F)

Eutermes infuscatus Sjöstedt, 1902, *Ent. Tidskr.*, **23**: 40; Nyasaland: Zomba.
Eustermes usambarensis Sjöstedt, 1904, *K. svenska Vetensk. Akad. Handl.*, **38**: 103; Tanganyika: Usambara.
Nasutitermes usambarensis (Sjöstedt); Kemp, 1955, *Bull. ent. Res.*, **46**: 33.

IMAGO. The range of variation in size is greater than was recorded in the description of the species.

	mm.
Width of head across eyes	1·29–1·32
Eye, greatest diameter	0·37–0·41
Ocellus	0·11×0·15–0·17
Ocellus to eye	0·09–0·10
Width of pronotum	1·07–1·11
Length of pronotum	0·68–0·72
Length of hind tibia	1·54–1·61
Length of fore wing	11·6–11·9

The Imago from the Usambara mountains is slightly darker than Sjöstedt's type material.

SOLDIER. The known range of variation in size is increased.

	mm.
Length of head capsule	1·33–1·69
Width of head capsule	0·63–1·00
Width of pronotum	0·42–0·64
Length of pronotum	0·17–0·29
Length of hind tibia	0·91–1·20

Specimens from Kenya, Tanganyika, and Nyasaland have been compared with the types of *N. infuscatus* and *N. usambarensis* and it has not been possible to distinguish them as two species. *N. usambarensis* therefore becomes a synonym of *N. infuscatus* (Sjöstedt). The specimens recorded as *N. maculiventris* (Sjöstedt) from Zanzibar (W. M. Aders, 1925) are actually *N. infuscatus* (Sjöstedt), and the former species must therefore be removed from the East African list.

A representative selection of localities is given, since the complete list is too long to be given in full. KENYA: Gedi, Shimba hills, 1950 (*W. V. Harris*). TANGANYIKA: Mwakijembe, Amani, 1951 (*P. B. Kemp*) Tunduru, Songea, 1938 (*W. V. Harris*). ZANZIBAR: Tunguu, 1951 (*W. V. Harris*). NYASALAND: Cholo-Mlanje, Kota-Kota, Nkata Bay, Songwe River, 1953 (*W. A. Sands and W. Wilkinson*).

This is essentially a forest or moist woodland species, found in the coastal belt of Tanganyika, and in the islands of Zanzibar, and Mafia. It follows the moister woodland of tall *Brachystegia* spp. inland in Southern Tanganyika, up to Songea, and is also found close to the shores of Lake Nyassa, and in Southern Nyasaland.

Nasutitermes kempae Harris

(Text-figs. 1, C; 3, C; 4, G, H.)

Nasutitermes kempae Harris, 1954, *Proc. R. Ent. Soc. Lond.*, **23** : 134–5, Tanganyika : Handeni.
Nasutitermes latifrons (Sjöstedt) ; Harris, 1936, *Bull. ent. Res.*, **27** : 368.

Imago. Previously undescribed.

Female, head capsule brown, paler very close to eyes and round antennal pit. Postclypeus and proximal two-thirds of labrum, antennae, legs, and ventral thoracic sclerites, yellow, Pro- meso- and metanota, mainly yellow-brown. Abdominal tergites sepia-brown, sternites yellow, shaded with brown round stigmata. Wings opaque, pale brown, subcosta and radius sector sepia at base, yellowish distally. Cubitus sepia at base, less distinct distally. Median narrow but distinct.

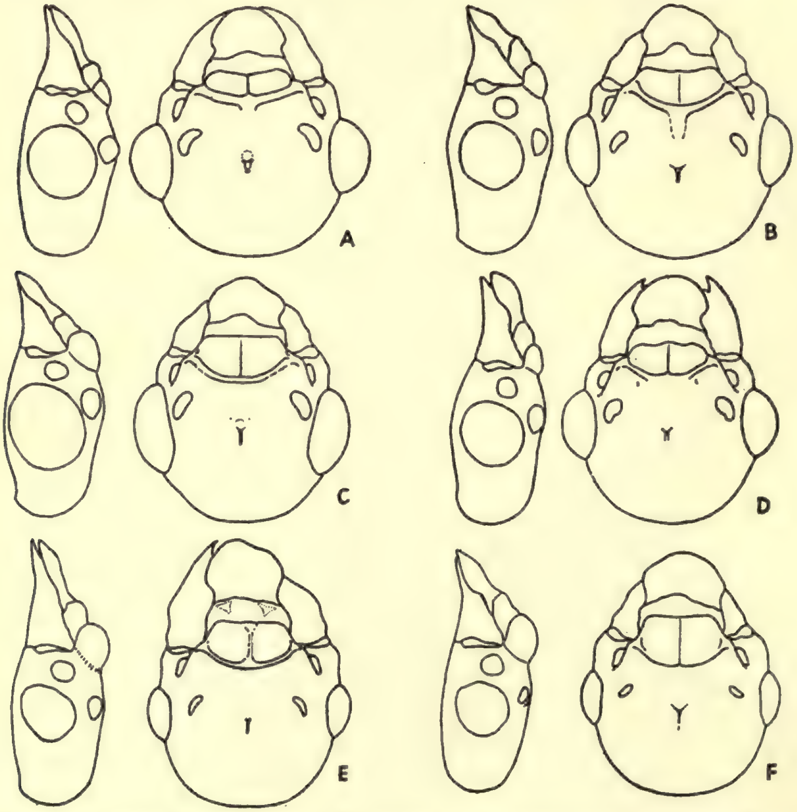

Fig 1.—Side and plan views of heads of Imagos. A, *Nasutitermes incurvus* (Sjöstedt) ; B. *Nasutitermes infuscatus* (Sjöstedt) ; C. *Nasutitermes kempae* Harris ; D. *Nasutitermes torquatus* (Sjöstedt) ; E. *Coarctotermes coarctatus* (Sjöstedt) ; F. *Coarctotermes tenebricus* (Silvestri).

Head wider across eyes than length to front of postclypeus ; frontal area slightly depressed with slit-like fontanelle, which is weakly bifurcate at its ventral end ; eyes very large, prominent, but not in proportion to diameter ; ocelli very large, almost touching eyes in some specimens, broad oval ; postclypeus short and broad, inflated, anterior margin straight, posterior margin convex ; anteclypeus membranous with two small sclerotizations ; labrum dilated about the middle ; antennae, 15 segmented, II and IV subequal, slightly longer than III and V, which are also subequal, though more variation may occur.

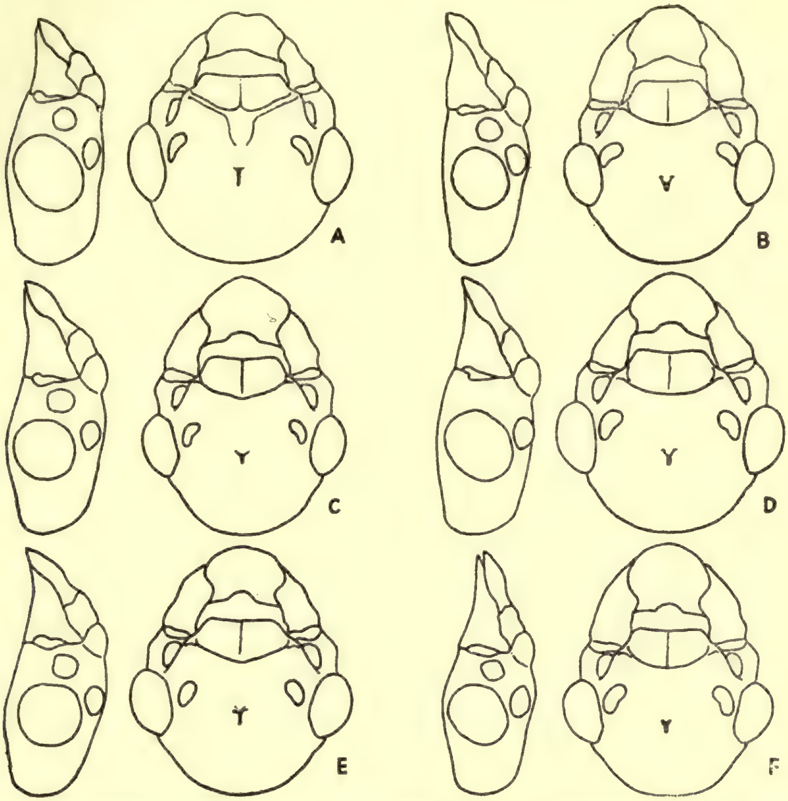

FIG. 2.—Side and plan views of heads of Imagos. A. *Grallatotermes africanus* Harris ; B. *Trinervitermes bettonianus* (Sjöstedt) ; C. *Trinervitermes dispar* (Sjöstedt) ; D. *Trinervitermes gratiosus* (Sjöstedt) ; E. *Trinervitermes lutzi* (Emerson) ; F. *Trinervitermes rapulum* (Sjöstedt).

Pronotum about one-sixth narrower than head across eyes, anterior margin slightly concave, sides rounded and converging to emarginate posterior.

Entire insect with short pale pubescence, apart from slightly darker hairs on intersegmental membrane of abdomen.

Wings densely covered with minute stellate papillae and short hairs.

Male, slightly smaller than female, otherwise identical.

	mm.
Head width across eyes	1·27–1·36
Eye greatest diameter	0·51–0·55
Ocellus	0·13–0·15×0·18–0·20
Ocellus to eye	0·01 or less–0·03
Width of pronotum	1·07–1·18
Length of pronotum	0·63–0·72
Length of hind tibia	1·50–1·64
Length of fore wing	10·9–11·7

Described from four females and two males.

MORPHOTYPE LOCALITY. TANGANYIKA TERRITORY, Pangani Falls, riverine forest, 13.xii.51 (*P. B. Kemp*).

Morphotypes in British Museum (Natural History)

SOLDIER. The discovery of further material has extended the known range of variation in size :

	mm.
Length of head capsule	1·61–2·05
Width of head capsule	0·88–1·29
Depth of head capsule	0·61–0·82
Width of pronotum	0·47–0·64
Length of pronotum	0·20–0·25
Length of hind tibia	0·91–1·28

This species is readily distinguished from *N. infuscatus* (Sjöst.) in the soldier caste by the longer nose, approximately equal in length to the rest of the head capsule, which is in addition more evenly rounded. The imago is more distinct, with very much larger eyes and ocelli, and a more inflated postclypeus than *N. infuscatus*. It is not likely to be confused with *N. chapini* Emerson since this species is found from Uganda westwards, whilst *N. kempae* occurs in eastern and southern Kenya and Tanganyika and in Nyasaland.

OTHER RECORDS. KENYA : Kwale, 1952 (*P. B. Kemp*), (*W. A. Sands*). TANGANYIKA : Ngomeni, 1950, Handeni, 1951–2, Luengera Valley, 1951, Daluni 1952 (*P. B. Kemp*). Morogoro, 1934, Songea, 1935, Turiani, 1936, Kisiru 1937 (*W. V. Harris*). ZANZIBAR : Josani Forest, Gendele Plantation, 1951 (*W. V. Harris*) Pemba Is., 1942 (*Packenham*). NYASALAND : Namwera Road 1953 (*W. A. Sands and W. Wilkinson*).

Though the distribution of *N. kempae* appears on a map to approximate closely to that of *N. infuscatus*, it seems to be capable of existing in rather drier conditions than the latter species.

Nasutitermes torquatus (Sjöstedt)

(Text-figs. 1, D ; 3, D, E ; 4, K, L)

Eutermes (*Eutermes*) *torquatus* Sjöstedt, 1924, *Rev. zool. afr.*, **12** : 494 ; Belgian Congo : Stanley–ville.

Nasutitermes (*Nasutitermes*) *torquatus* (Söjstedt) ; Emerson, 1928, *Bull. Amer. Mus. nat. Hist.*, **57** : 481.

IMAGO. Fontanelle more variable than was stated by Emerson ; in the male, from a short whitish streak, slightly bifurcate at anterior end, to almost obsolete, very slightly paler than the rest of the head ; in the female, from an elongated white slit to an indistinct pale patch.

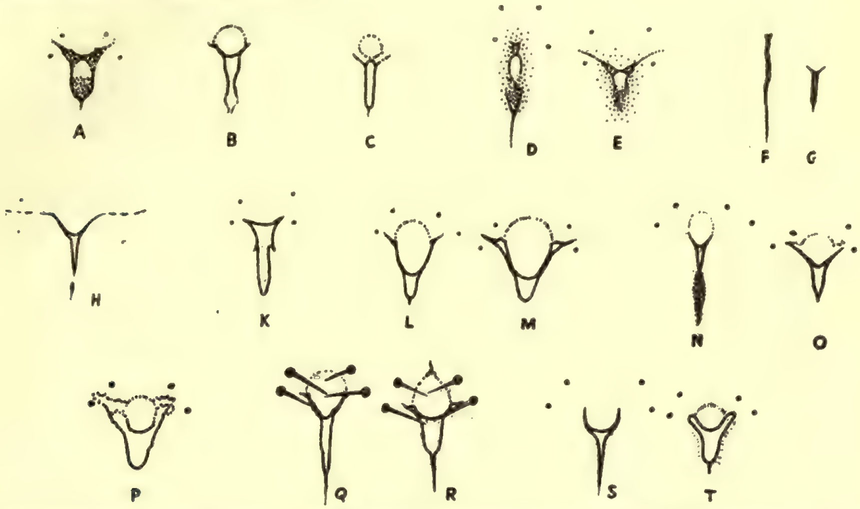

FIG. 3.—Fontanelles of Imagos. A. *Nasutitermes incurvus* (Sjöstedt) ; female ; B. *Nasutitermes infuscatus* (Sjöstedt), male ; C. *Nasutitermes kempae* Harris, male (female similar) ; D, E. *Nasutitermes torquatus* (Sjöstedt), male and female respectively ; F, G. *Coarctotermes coarctatus* (Sjöstedt), male and female ; H. *Coarctotermes tenebricus* (Silvestris), male ; K. *Grallatotermes africanus* Harris, male ; L, M. *Trinervitermes bettonianus* (Sjöstedt), male and female ; N, O. Trinervitermes dispar (Sjöstedt), male and female ; P. *Trinervitermes gratiosus* (Sjöstedt), female ; Q, R. *Trinervitermes lutzi* Emerson, male and female ; S, T. *Trinervitermes rapulum* (Sjöstedt), male and female.

Range of variation in size considerably greater than was recorded by Emerson.

	mm.
Width of head across eyes	1·36–1·50
Eye, greatest diameter	0·44–0·48
Ocellus	0·13×0·16–0·20
Ocellus to eye	0·07–0·10
Width of pronotum	1·04–1·18
Length of pronotum	0·72–0·78
Length of hind tibia	1·72–1·80
Length of fore wing	12·5–14·7

SOLDIER. Range of variation in size much greater than previously known.

	mm.
Head length to tip of nose	1·39–1·89
Head width	0·78–1·11
Depth of head capsule	0·55–0·74
Width of pronotum	0·47–0·54
Length of pronotum	0·18–0·25
Length of hind tibia	1·04–1·39

These specimens agree closely with some from the type locality (H. Kohl collection, No 77TZ.) determined by Emerson (1928) as *N. torquatus* (Sjöstedt), and with the descriptions of this species. They have not, however, been compared with Sjöstedt's type material. The imago of this species is readily distinguishable from other East African forms, but the soldier cannot be separated from that of *N. infuscatus* (Sjöstedt). The two species are unlikely to be confused, since *N. torquatus* inhabits the Uganda and Congo Forests, and *N. infuscatus*, Nyasaland and coastal East Africa.

UGANDA: Kigezi, 1947, Bwamba, 1949 (*W. V. Harris*); Kampala, 1955 (*W. Wilkinson*).

COARCTOTERMES Holmgren

Coarctotermes brunneus Noirot.

(Text-fig. 4, O, P)

Coarctotermes brunneus Noirot, 1955, *Publ. cult. Cia Diamant. Angola, Separata*, **27** : 139–150.

SOLDIER. The following additions to the description of this species must be made: Head in profile only moderately swollen, behind shallow constriction; in plan view, back of head capsule frequently with a distinct median longitudinal groove. Mandibles with small to vestigial points only.

Pronotum slightly or not emarginate anteriorly.

	mm.
Head length to tip of nose	1·14–1·50
Head width	0·54–0·79
Depth of head capsule	0·40–0·52
Width of pronotum	0·32–0·42
Length of pronotum	0·15–0·18
Length of hind tibia	0·68–0·94

WORKER. Mandibles of the *C. tenebricus* form, that is, with the cutting edge between the first and "second" (morphologically third) marginal teeth deeply notched just distal to the "second" marginal.

This species, with its grooved soldier head, is apparently distinct in this respect from all other *Coarctotermes* species.

NORTHERN RHODESIA: Abercorn, 1947 (*P. E. Glover*).

Coarctotermes coarctatus (Sjöstedt)

(Text-figs. 1, E; 3, F, G; 4, M, N)

Eutermes coarctatus Sjöstedt, 1902, *Ent. Tidskr.*, **23** : 304. Nyasaland: Zomba.
Coarctotermes coarctatus (Sjöstedt); Fuller, 1922, *S. Afr. J. nat. Hist.*, **3** : 118–9.

IMAGO. Fontanelle present in all specimens examined, though very narrow in some, never absent as stated by Fuller; in males slit-like, in females shorter and broader, often distinctly bifurcate anteriorly.

The range of size variation may be extended.

	mm.
Width of head across eyes	1·18–1·27
Eye greatest diameter	0·33–0·37
Ocellus	0·09–0·10 × 0·12–0·14
Ocellus to eye	0·12–0·15
Width of pronotum	1·06–1·18
Length of pronotum	0·72–0·75
Length of hind tibia	1·43–1·63
Length of fore wing	10·0–11·2

The smaller size, dark colour, twelve segmented antennae (rarely 13), and deeply constricted head distinguish this from the other two East African species in the

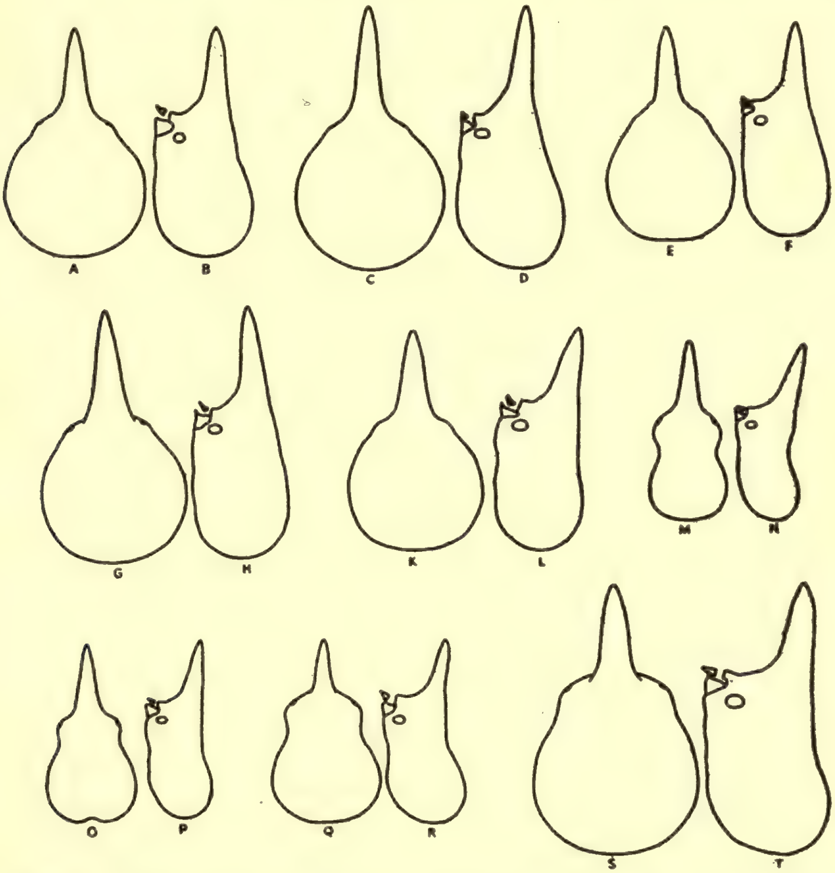

Fig. 4.—Plan and side views of heads of soldier caste. A, B. *Nasutitermes chapini* Emerson ; C, D. *Nasutitermes incurvus* (Sjöstedt) ; E, F. *Nasutitermes infuscatus* (Sjöstedt) ; G. H. *Nasutitermes kempae* Harris ; K, L. *Nasutitermes torquatus* (Sjöstedt) ; M, N. *Coarctotermes coarctatus* (Sjöstedt) ; O, P. *Coarctotermes brunneus* Noirot ; Q, R, *Coarctotermes tenebricus* (Silvestri) ; S, T. *Grallatotermes africanus* Harris.

soldier caste. The Imago is generally darker than that of *C. tenebricus*, has larger ocelli and slightly longer wings (10–11 mm. as against 8–8·5 mm. in *C. tenebricus*).

TANGANYIKA: Mwakijembe, 1951, Mgera, Kijungu, 1952 (*P. B. Kemp*); Morogoro, 1934, Handeni, 1936, Iringa, 1937 (*W. V. Harris*); Kongwa, 1952 (*H. C. Periera*). NYASALAND: Zomba, 1954 (*Topotypes*) (*E. L. Drake*); Ekwendeni 1953 (*W. A. Sands and W. Wilkinson*).

Coarctotermes tenebricus (Silvestri)

(Text-figs. 1, F; 3, H; 4, Q, R)

Eutermes tenebricus Silvestri, 1914, *Boll. Lab. zool. Portici*, **9**: 44; French Guinea: Kakoulima.

Recorded from Delami, Anglo-Egyptian Sudan, but not yet from Uganda, this appears to be an inhabitant of the Guinean zone. and as such probably occurs in Northern Uganda. It is included in the key to enable its identification if collected in East Africa.

GRALLATOTERMES Holmgren

Grallatotermes africanus Harris

(Text-figs. 2 A; 3 K; 4, S, T)

Grallatotermes africanus Harris, 1954, *Proc. R. ent. Soc. Lond.*, **23**: 135–7, Tanganyika: Ngomeni, Tanga.

This species is found only in dense woodland near the coast of Kenya and Tanganyika.

TRINERVITERMES Holmgren

Trinervitermes auriterrae Sjöstedt

(Text-fig. 6, A, B)

Trinervitermes auriterrae Sjöstedt, 1926, *Ark. Zool.*, **18**: 3; Gold Coast: Keta.

SOLDIER. Fontanelle very large, 0·07–0·09 mm. in diameter. Range of measurements of major soldier greater than was indicated by Sjöstedt.

	mm.
Head length to tip of nose	2·18–2·50
Width of head capsule	1·29–1·54
Depth of head capsule	0·97–1·07
Width of pronotum	0·61–0·68
Length of pronotum	0·25–0·29
Length of hind tibia	1·32–1·54

This species is easily recognized by the fontanelle which is almost twice as large as that of any other species in East Africa.

UGANDA: Mbale, 1937, and Serere, 1948 (*W. V. Harris*).

This is another inhabitant of the Guinean Zone, and is found from Uganda across to the west coast of Africa,

Trinervitermes bettonianus (Sjöstedt)

(Text-figs. 2, B ; 3, L, M ; 5, A–E)

Eutermes bettonianus Sjöstedt, 1905, *Ark. Zool.*, **2** : 19 ; Kenya : Athi River.
Eutermes bettonianus Sjöstedt ; Sjöstedt, 1907, *Ent. Tidskr.*, **28** : 246.
Eutermes segelli Sjöstedt, 1910, *Wiss. Ergeb. Schwed. Zool. Expdn. Kilimandjaro, Meru*, 1905–1906, **3** : 26 ; Tanganyika : Boma ngombe, Kilimandjaro.
Trinervitermes segelli (Sjöstedt) ; Sjöstedt, 1926, *K. svenska Vetensk. Akad : Handl.*, **3** : 326.
Trinervitermes bettonianus (Sjöstedt) ; Sjöstedt, 1926, *ibid.*, **3** : 332.
Trinervitermes segelli (Sjöstedt) ; Harris, 1936, *Bull. ent. Res.*, **27** : 368.
Trinervitermes segelli (Sjöstedt) ; Kemp, 1955, *ibid.*, **46** : 133.

This termite is redescribed from the larger amount of material now available.

IMAGO. Male, head dark, reddish to sepia brown. Area surrounding eye, ocellus, and base of antenna, three indistinct streaks diverging forwards on vertex, and postclypeus, paler, yellow-brown. Antennae and basal part of labrum, yellow-brown, apical third of labrum, hyaline. Thoracic sclerites and legs yellow-brown. Abdominal tergites darker brown, sternites yellow-brown, clouded with darker brown round the stigmata. Wings opaque, pale brown.

Head rather wider across eyes than length to front of postclypeus ; frontal area slightly depressed with V or inverted A-shaped fontanelle ; eyes large, prominent, broad oval ; ocelli large, oval to broad oval, very close to but not touching eyes ; postclypeus short and broad, inflated, anterior margin straight, posterior margin convex ; anteclypeus largely membranous, with two small reniform or semi-circular sclerotizations ; labrum dilated about middle ; antenna with 15 segments, proportions of basal segments variable, both III and IV may be partially divided into two in largest specimens.

Head, antennae, postclypeus, and labrum with numerous scattered pale hairs.

Pronotum from one eighth narrower to slightly wider than head across eyes, anterior margin slightly concave, sides broadly rounded and tapering to the distinctly emarginate posterior.

Thorax and abdomen with scattered pale hairs, intersegmental membrane of abdomen with more uniform reddish pubescence, wings densely covered with minute stellate papillae and numerous short hairs. Veins dusky at base, paler, sometimes indistinct distally.

Female generally as the male, but sometimes slightly larger, with slightly longer wings and slightly short hind tibia.

	mm.
Head width across eyes	1·55–1·82
Greatest diameter of eye	0·47–0·59
Ocellus	0·20–0·24 × 0·22–0·31
Ocellus to eye	0·03–0·06
Width of pronotum	1·39–1·85
Length of pronotum	0·88–1·22
Length of hind tibia	1·98–2·43
Length of fore wing	14·2–22·3

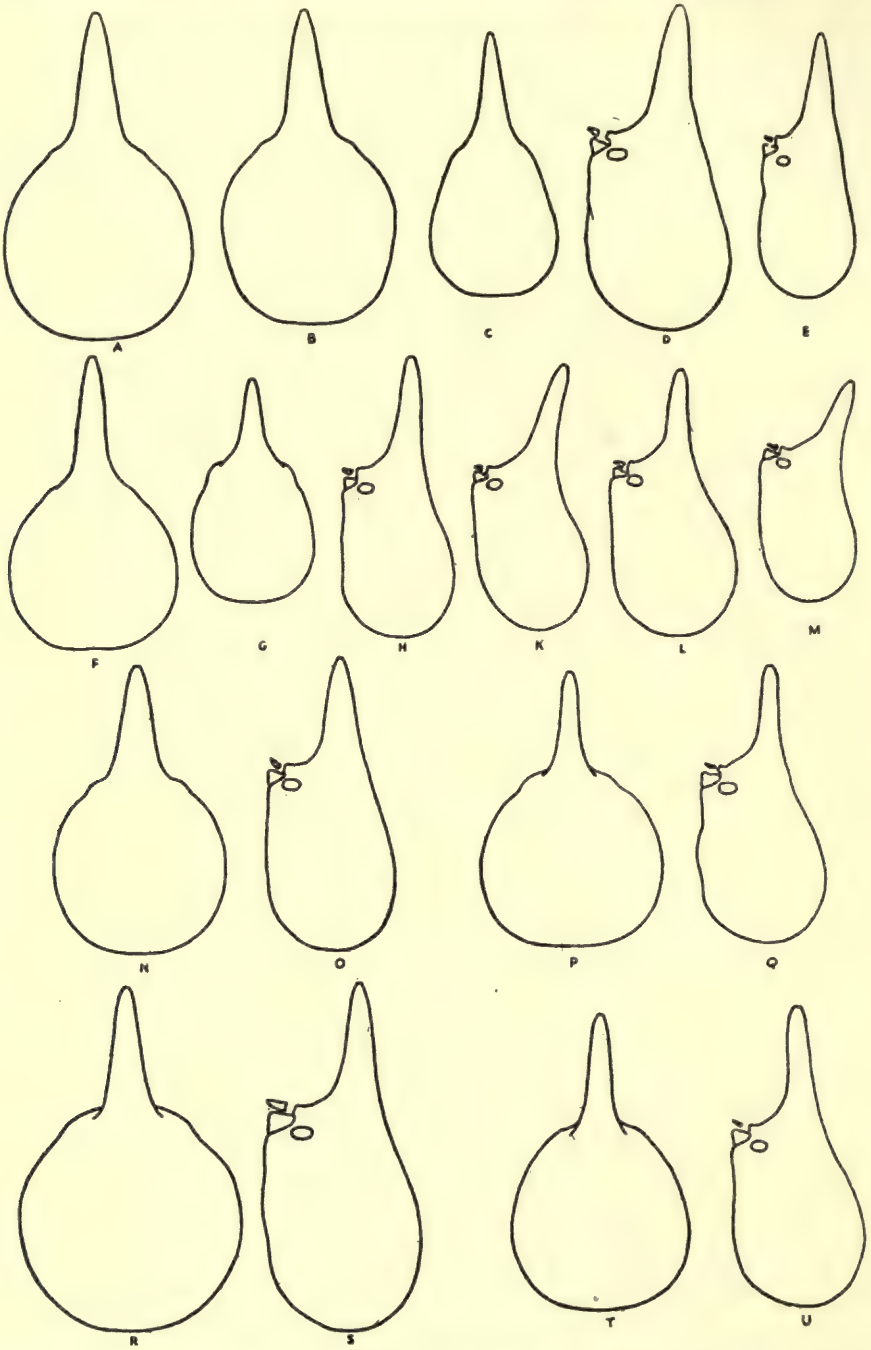

Fig. 5.—Pland and side views of heads of soldier caste. A–E. *Trinervitermes bettonianus* (Sjöstedt); F–M. *Trinervitermes dispar* (Sjöstedt); N, O. *Trinervitermes crassinasus* (Sjöstedt); P, Q. *Trinervitermes rapulum* (Sjöstedt); R, S. *Trinervitermes gratiosus* (Sjöstedt); T, U. *Trinervitermes lutzi* (Emerson).

Described from topotypes and from numerous specimens from other parts of East Africa.

SOLDIER. Major soldier, head colour varies from orange yellow to chestnut brown, commonly ferruginous ; nose usually slightly darker than the head capsule ; antennae, pronotum, and legs, pale yellow, sometimes slightly darker ; abdominal sclerites sepia brown.

Head in plan view variable, in some specimens oval, tapered anteriorly, in others more regular oval ; some more angular, tapering either towards the front or the rear, some almost circular ; nose tapering uniformly from base to apex. Head profile flat to distinctly concave, angle between nose and rest of head varying by 20 degrees. Length of nose (measured to hind margin of antennal pit) from more than a fifth less up to equal to rest of head.

Antennae, 12–13 segmented, relative proportions of basal segments variable. Pronotum saddle-shaped, anterior margin entire or more or less emarginate.

Minor soldier, coloration much as major soldier, often with more contrast between head and nose colour.

Antennae, 12 segmented ; pronotum saddle-shaped, anterior margin entire, evenly rounded.

	Major soldier mm.	Minor soldier mm.
Head length to tip of nose	1·93–2·49	1·33–1·82
Width of head	0·97–1·43	0·57–0·93
Depth of head	0·72–1·07	0·43–0·70
Width of pronotum	0·54–0·72	0·40–0·54
Length of pronotum	0·22–0·32	0·18–0·25
Length of hind tibia	1·11–1·57	0·95–1·40

Topotype alates of *T. bettonianus* from Ruiru on the Athi River, Kenya, and numerous other specimens from all parts of East Africa were compared with the type specimen in the British Museum (Natural History), and found to be of this species. They were in all cases associated with soldiers agreeing closely with *T. segelli* (Sjöstedt), which is therefore reduced to a synonym of *T. bettonianus*. There thus arises some doubt concerning the identity of Sjöstedt's " Cotype " specimens from Mukimbungu, and hence any specimens identified from them (e.g. *Trinervitermes bettonianus* (Sjöstedt), Emerson, 1928, *Bull. Amer. Mus. Nat. Hist.*, **57** : 492). These appear from the description to be nearer to *T. gratiosus* (Sjöstedt), though slightly smaller than is usual in this species.

The species most likely to be confused with *T. bettonianus* when both soldiers and alates are present is *T. gratiosus*, but the soldiers of this species, though otherwise somewhat similar, have a much less conical nose, and in the majority of cases, 14 segmented antennae,

The largest imagos of *T. bettonianus* approach the size of *T. gratiosus* but have the forehead more depressed, the head capsule more hairy, than the latter species. Other differences are given in the keys attached to this account.

A representative selection of records is given, since the collections of this species are too large to give the complete list.

KENYA: Ruiru, 1950 (*W. V. Harris*); Kwale, 1952 (*P. B. Kemp*); West Suk, 1952; Meru, Marsabit, 1953 (*W. A. Sands*). UGANDA: Moroto, 1952 (*W. A. Sands*). TANGANYIKA: Bomangombe (topotypes of *T. segelli*) 1950, Morogoro, 1934, Kigoma, 1934, Dodoma, 1940 (*W. V. Harris*); Tanga, 1951, Handeni, 1952, Kakoma, Shinyanga, 1948 (*P. B. Kemp*); nr. Ngare Nairobi, 1954 (*R. M. C. Williams*). ZANZIBAR: Kizumbani, 1951 (*P. B. Kemp*); Bawi Is., 1951 (*W. V. Harris*). NYASALAND: Mlanje, Monkey Bay, Nkata Bay, Nchenanchena, Chisenga, 1953 (*W. A. Sands and W. Wilkinson*). NORTHERN RHODESIA: Lusaka, 1947 (*W. V. Harris*). BELGIAN CONGO: Lukinda (*H. Bredo*).

Though widely distributed in East Africa, this species is absent from the *Brachystegia-Isoberlinia* woodland which streches over large areas of Tanganyika, Nyasaland, and Northern Rhodesia. It appears to be more tolerant of altitude than many species, being found up to 6,000 ft. near Nairobi, Kenya, and is the only true "East African" species as yet recorded from North-Eastern Uganda. On Mt. Marsabit in the semi-desert of northern Kenya, it is found in the grassland just below the forest zone, but it has not been recorded from the surrounding dry country. In Nyasaland it is almost entirely confined to the Rift Valley, along the shore of Lake Nyassa and down the Shire Valley.

The mound building habits of *T. bettonianus* are of particular interest, being in marked contrast to those of the almost equally widely distributed *T. dispar* (Sjöstedt). Of 49 records, 36 colonies had independent small mounds, 3 had no visible structures above ground level, and 10 were associated more or less intimately with the much larger mounds of Macrotermitinae, either *Macrotermes* or *Pseudacanthotermes*.

Trinervitermes carbonarius Sjöstedt

(Text-fig. 6, C, D)

Trinervitermes carbonarius Sjöstedt, 1926, *Rev. zool. africaine*, **12**: 158; Belgian Congo: Haut Uélé.

Nasutitermes (*Trinervitermes*) *carbonarius* (Sjöstedt); Emerson, 1928, *Bull. Amer. Mus. nat. Hist.* **57**: 448–9.

SOLDIER. Major soldier, specimens agree well with Types, except that antennae often have 13 segments instead of 14, and measurements are somewhat more variable.

Minor soldier, range of measurements has also increased.

	Major soldier mm.	Minor Soldier mm.
Head length to tip of nose	2·43–2·64	1·79–1·96
Width of head	1·36–1·66	0·78–0·93
Depth of head	1·00–1·14	0·61–0·64
Width of pronotum	0·64–0·75	0·47–0·54
Length of pronotum	0·29–0·32	0·22–0·29
Length of hind tibia	1·60–1·80	1·39–1·68

UGANDA: Soroti, 1952 (*W. A. Sands*); Serere, 1948, and Ngotokwe, Lango, 1942 (*W. V. Harris*); Kampala, 1955 (*R. M. C. Williams*).

All these records are from lake shore or riverine situations, at least one nest being within a few yards of the water's edge. The nest itself is a fairly large hard mound, up to 4 feet high having been recorded.

This species is another of those which extend across to the west coast of Africa, but it appears to be associated with moister conditions than the Northern Guinean Savannah Zone.

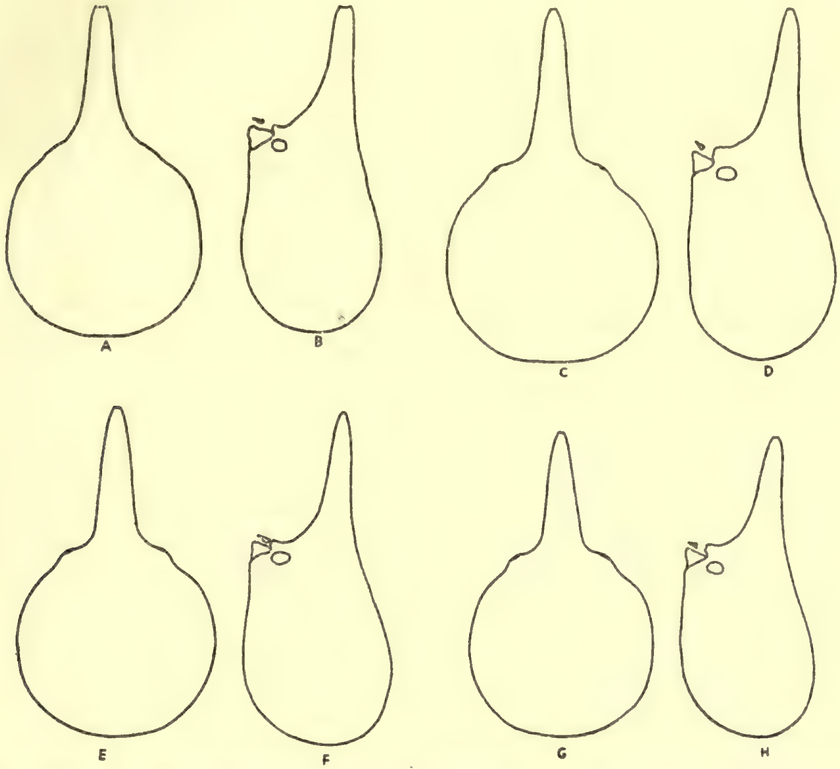

FIG. 6.—Plan and side views of heads of soldier caste. A, B. *Trinervitermes auriterrae* Sjöstedt; C, D. *Trinervitermes carbonarius* Sjöstedt; E, F. *Trinervitermes ebenerianus* Sjöstedt; G, H. *Trinervitermes oeconomus* (Trägårdh).

Trinervitermes crassinasus (Sjöstedt)

(Text-fig. 5, N, O)

Eutermes crassinasus Sjöstedt, 1914, *Ark. Zool.*, 8 : 6–7, Zambezi : Villa Fontes.

SOLDIER. Closely resembles *T. bettonianus* in appearance, but head more rounded in plan view, and antennae more consistently with 13 segments.

NYASALAND : Lower Shire Valley, near Ngabu on the Chiromo Road, 1953 (*W. A. Sands and W. Wilkinson*).

This locality is quite close to that given by Sjöstedt, and since the species is not known elsewhere, it may be confined to the region of the Zambezi valley and its tributaries.

Trinervitermes dispar (Sjöstedt)

(Text-figs. 2, C; 3, N, O; 5, F–M)

Eutermes dispar Sjöstedt, 1902, *Ent. Tidskr.* **23** : 303, Nyasaland : Zomba.
Eutermes gemellus Sjöstedt, 1910, *Wiss. Ergeb. Schwed. Zool. Expdn. Kilimandjaro, Meru,* 1905–1906, **3** : 26.

Imago. Described here, previously unknown.

Female: head colour varies from pale red-brown to sepia. Area surrounding eye, ocellus, and base of antenna, sometimes part of vertex, and postclypeus, paler, yellow-brown. Labrum, antennae, pronotum, and legs, yellow-brown; abdominal sclerites mainly yellow-brown, darker towards lateral margins; wings opaque, pale brown.

Head rather wider across eyes than length to front of post-clypeus; frontal area slightly depressed, with slit-like Y-shaped fontanelle; eyes large, prominent, almost circular; ocelli large, broad oval, close to but not touching eyes; postclypeus short and broad, inflated, anterior margin slightly concave, posterior margin convex; anteclypeus yellowish-white; labrum dilated, distal third white; antenna with 15 segments, proportions of II, III, IV, and V variable. Pronotum rather narrower than the head across the eyes, anterior margin slightly concave, sides broadly rounded and converging to the distinctly emarginate posterior; entire insect with numerous scattered pale hairs, apart from intersegmental membrane of abdomen, which bears more uniform reddish pubescence.

Wings densely covered with minute stellate papillae and numerous short hairs. Subcosta and radius-sector dark brown at base, becoming paler distally; median and cubitus dusky brown.

Male: Ocelli sometimes slightly smaller than the female, wings slightly shorter, fontanelle slightly narrower, often with a dusky patch at the dorsal tip.

	mm.
Width of head across eyes	1·40–1·49
Eye, greatest diameter	0·44–0·49
Ocellus	0·16–0·19×0·19–0·23
Ocellus to eye	0·03–0·04
Width of pronotum	1·28–1·42
Length of pronotum	0·84–0·92
Length of hind tibia	1·65–1·89
Length of fore wing	14·3–17·8

Described from eleven females and seven males from low mounds from Zomba, and numerous other specimens from various localities in Tanganyika.

Morphotype locality. Nyasaland, Zomba, the Golf course, 14.xii.54 (E. L. Drake). Morphotypes in British Museum (Natural History).

Soldier. The soldier of this species is much more variable than was recorded by Sjöstedt.

Major soldier, head yellow to yellow-brown, nose from same colour as head to almost black, with paler tip. Nose may be tapering, parallel sided, even slightly dilated at the tip, and from slightly longer to one fifth or more shorter than rest of head capsule, measured to hind margin of antennal pit. Nose in profile slopes away from head forming angle varying from 140 to 165 degrees. Antennae, with 12–14 segments, commonly 13, proportion of basal segments varying with size of specimen. Minor soldier, coloration as major soldier, but nose nearly always darker. Antennae with 12 segments, proportion of basal segments variable.

	Major soldier mm.	Minor soldier mm.
Head length to tip of nose	1·71–2·23	1·18–1·61
Width of head	0·93–1·36	0·43–0·64
Depth of head	0·68–0·99	0·36–0·50
Width of pronotum	0·54–0·68	0·38–0·47
Length of pronotum	0·18–0·25	0·13–0·20
Length of hind tibia	1·04–1·39	0·82–1·18

After examination and comparison of many specimens from all parts of East Africa including Nyasaland, the specimens from Ngare Nanyuki, Tanganyika, collected and determined by Sjöstedt (1907) as *Trinervitermes gemellus* (Sjöstedt) are included in *T. dispar* (Sjöstedt). Soldiers and Alates from that area of Tanganyika are indistinguishable from the types and morphotypes from Zomba, Nyasaland, as are others from other parts of Tanganyika.

The type specimens (soldiers only) of *T. gemellus* (Sjöst.) from South Africa have also been examined, and these are similarly indistinguishable from *T. dispar* (Sjöst.) but in the absence of alates in the *T. gemellus* (Sjöst.) type collection, the two species cannot be amalgamated at present. It seems likely that if *T. gemellus* (Sjöst.) exists as a separate species, it is confined to southern Africa.

Snyder (1949, *Smithson. misc. Coll.* **112** : 1–490) refers the description of the imago of *T. dispar* (Sjöst.) to Fuller (1922), but this is incorrect. Fuller states that the imago is unknown, since the description of it by Holmgren (1914) should be referred to *T. zuluensis* (Holmgren).

The range of variation in the soldier caste of *T. dispar* (Sjöst.) is such that it overlaps with *T. rapulum* (Sjöst.) in some cases, and with *T. lutzi* Emerson in others. The alates are more readily separated, *T. lutzi* Emerson being distinguished from the other two species by its larger size, ampler wings, somewhat angular postclypeus, and fontanelle with four spines. *T. dispar* (Sjöst.) differs from *T. rapulum* (Sjöst.) in the nearly circular eyes, the narrower fontanelle, and the consistently 15-segmented antennae.

OTHER RECORDS. A representative selection of localities is given, since the complete list is too long to be included.

KENYA : Kinango (near Mombasa) 1952 (P. B. Kemp) : Mtito Andei, 1954 (*R. M. C. Williams*).

TANGANYIKA : Tanga, 1950, Kihurio, Mkomasi Valley, 1952, Niamansi River, Kakoma, Shinyanga, 1948 (*P. B. Kemp*) ; Kigoma, 1934, Lindi, 1938 (*W. V*

Harris) ; Sanya Plain (nr. Arusha) 1954 (*R. M. C. Williams*) NYASALAND : Limbe, Benga, Ekwendeni, Chisenga, 1953 (*W. A. Sands and W. Wilkinson*). PORTUGUESE EAST AFRICA : Vila Coutina, 1953 (*W. A. Sands and W. Wilkinson*). NORTHERN RHODESIA : Tunduma, 1953 (*W. A. Sands and W. Wilkinson*).

Though found over a wide area, this species appears to be largely confined to *Brachystegia-Isoberlinia* woodland. At the northern end of its range however, *T. dispar* is found up to 150 miles beyond the present limit of this vegetation type. Its nesting habits are widely different from those of *T. bettonianus* (Sjöstedt). Of 30 records, four had small ill-defined independent mounds, eight had no structure above ground level, and 18 colonies occupied parts of the mounds of *Cubitermes* spp. Thus it appears that this species rarely builds a mound itself. If no *Cubitermes* mound is available, the nest usually remains entirely subterranean.

Trinervitermes ebenerianus Sjöstedt

(Text-fig. 6, E, F)

Trinervitermes ebenerianus Sjöstedt, 1926, *Denkschr. Akad. Wiss. Wein*, **100** : 73, 76 ; Sudan : Tanguru.

UGANDA : Karamoja District, 40 miles from Moroto on Soroti road, 1952 (*W. A. Sands*) ; West Nile District, 3 miles from Moyo on Arua road, 1955 (*W. Wilkinson*).

This appears to be another inhabitant of the Guinean zone. though more records are required to confirm its distribution.

Trinervitermes gratiosus (Sjöstedt)

(Text-figs. 2, D ; 3, P ; 5, R, S)

Eutermes (*Trinervitermes*) *gratiosus* Sjöstedt, 1924, *Rev. zool. afr.* **12** : 42, Belgian Congo : Luluabourg.
Trinervitermes gratiosus (Sjöstedt) ; Harris, 1936, *Bull. ent. Res.* **27** : 368.
Trinervitermes bettonianus (Sjöstedt) ; Harris, 1936, *ibid.*, **27** : 368.
Trinervitermes bettonianus (Sjöstedt) ; Kemp, 1955, *ibid.*, **46** : 134.

IMAGO. Specimens agree with types.

SOLDIER. Both Major and Minor soldiers are more variable in size and colour than was recorded by Sjöstedt. Darker specimens are deep chestnut brown, the nose almost black.

	Major soldier mm.	Minor soldier mm.
Head length to tip of nose	2·11–2·93	1·61–1·94
Head capsule width	1·18–1·81	0·75–1·06
Depth of head capsule	0·86–1·25	0·57–0·82
Width of pronotum	0·61–0·84	0·47–0·61
Length of pronotum	0·29–0·43	0·22–0·25
Length of hind tibia	1·54–1·96	1·22–1·68

The measurements given disregard any possible distinction between "A" and "B" forms, since it was found that all the intermediates between these apparent groupings are usually present in sufficiently large collections, and to separate them is not practicable in this species.

KENYA: Mtito Andei, 1950 (*W. V. Harris*). TANGANYIKA: Uvinza, 1934, Ukerewe, 1938, Mbeya, 1939 (*W. V. Harris*). Babati, 1950, Handeni, Morogoro, Mwakijembe, 1951, Mwanza, 1948 (*P. B. Kemp*). UGANDA: Lake George, 1937, Mbarara, Edward-George Flats, 1949 (*W. V. Harris*). RUANDA URUNDI: Ruindi, 1948, Gabiro, 1952 (*W. V. Harris*).

T. gratiosus appears to be able to tolerate drier conditions than the majority of species, and constructs a fairly large domed mound, up to 2 feet in height. There is one record of this species occupying part of a mound of *Pseudacanthotermes*.

Trinervitermes lutzi (Emerson)

(Text-figs. 2, E; 3, Q, R; 5, T, U)

Nasutitermes (*Trinervitermes*) *lutzi* Emerson, 1928, *Bull. Amer. Mus. nat. Hist.* **57**: 494; Belgian Congo: Niangara.

IMAGO. Hitherto undescribed.

Male, head yellow-brown, clouded with slightly darker brown on frons; area surrounding eye, antennal base, and ventral half of ocellus, yellow. Antennae, legs, and rest of body sclerites yellow apart from abdominal tergites, which are yellow-brown, slightly darker round stigmata. Wings opaque, pale brown, venation more strongly pigmented, yellow-brown, near base.

Head wider across eyes than length to front of postclypeus; frontal area slightly depressed, with long, slender Y-shaped fontanelle, ventral arms of which partly enclosed by 3 or 4 large inwardly directed spines or bristles, shorter but stouter than other head setae; eyes large, very prominent, very broad oval; ocelli large, very broad oval, close to but not touching eyes; postclypeus short and broad, anterior margin slightly concave, posterior margin convex, arched, slightly angular, not semicircular; anteclypeus largely membranous; labrum dilated about middle; antennae 15 segmented; head and antennae with scattered pale hairs.

Pronotum about one-eighth narrower than head across eyes, rounded sides converging to very slightly emarginate posterior. Thorax and abdomen with inconspicuous pale pubescence. Wings covered with minute stellate papillae.

Female: closely resembles male. Fontanelle slightly shorter and broader, wings shorter, hind tibia slightly shorter.

	mm.
Width of head across eyes	1·65–1·69
Eye, greatest diameter	0·53–0·56
Ocellus	0·18–0·20×0·21–0·23
Ocellus to eye	0·03–0·05
Width of pronotum	1·42–1·48
Length of pronotum	0·91–0·97
Length of hind tibia	1·93–2·18
Length of fore wing	18·0–20·0

Described from six males and three females (one of these a queen) from stony hillsides in dry *Brachystegia* woodland.

Morphotype locality: Northern Rhodesia, Nzizye, Abercorn, xii.48, (*P. Glover*). Morphotypes in British Museum (Natural History).

Soldier. Major soldiers slightly smaller than types, increasing the range of measurements.

	mm.
Head length to tip of nose	1·98–2·28
Width of head	1·14–1·38
Depth of head	0·82–1·00
Width of pronotum	0·56–0·67
Length of pronotum	0·25–0·19
Length of hind tibia	1·16–1·36

Though in some cases the soldiers of *T. lutzi* may be confused with those of *T. dispar* or *T. rapulum*, the imago is distinct from any other species of *Trinervitermes* in East Africa, in having robust spine-like bristles guarding the fontanelle. Some species have small setae in a similar position but these are no larger than the other head setae.

Other records. Northern Rhodesia: Gankonde, Mkoma, Abercorn, 1949 (*P. Glover*). Uganda: Luentobo, Ankole, 1947 (*W. V. Harris*).

Emerson's type locality is Niangara, on the Uélé River, in the Northern Congo. *T. lutzi* may therefore be distributed round the fringe of the Congo Forest, crossing the ecological barrier which apparently exists for some species near the Equator in Uganda.

Trinervitermes oeconomus (Trägårdh)

(Text-fig. 6, G, H)

Eutermes oeconomus Trägårdh, 1904, *Results Swed. Zool. Exp. Egypt and White Nile*, 1900–1, **12**: 23; Sundan: Kaka.

Trinervitermes oeconomus (Trägårdh); Sjöstedt, 1926, *K. svenska Vetensk. Akad. Handl.*, **3**: 349.

Uganda: Mbale, 1937, Butiaba, 1946 and 1950 (*W. V. Harris*); Toror Hills, Karamoja district, Soroti, 1952 (*W. A. Sands*).

This species is the last of those known to occur in the Guinean zone, and extending across the continent to West Africa. It constructs low domed mounds.

Trinervitermes rapulum (Sjöstedt)

(Text-figs. 2, F; 3, S, T; 5, P, Q)

Eutermes rapulum Sjöstedt, 1904, *Nachtr. K.svenska Vetensk. Akad. Handl.*, **38**: 99, Tanganyika: Usambara, Tanga.

Imago. Described here, previously unknown. Female, head mainly yellow-brown, area surrounding eye, ocellus, and base of antenna, and an area of vertex, pale yellow. Colour varies little in the specimens examined, the darkest being ferruginous brown. Antennae, basal part of labrum, thoracic sclerites, and legs, pale yellow. Anteclypeus and apical part of labrum, white. Abdominal sternites pale yellow, sometimes slightly darker round stigmata, tergites clouded with yellow-brown round stigmata. Wings opaque, almost colourless, subcosta, radius and cubitus yellow-brown at base, paler distally.

Head wider across the eyes than length to front of postclypeus ; frontal area slightly depressed, with short, rather broadly Y-shaped fontanelle (longer, narrower, U-shaped in male) ; eyes large, prominent, broad oval or very slightly reniform ; ocelli large, oval, close to but not touching eyes ; postclypeus short and broad, inflated, anterior margin very slightly concave, posterior margin convex ; anteclypeus largely membranous ; labrum dilated about middle ; antennae 15–16 segmented, intermediate stages represented, proportions of segments variable ; head, antennae, postclypeus and labrum with scattered pale hairs.

Pronotum generally about one-eighth narrower than head across eyes, anterior margin slightly concave, sides tapering to emarginate posterior, somewhat straighter than most species, or even slightly sinuate. Scattered pale hairs.

Abdomen with numerous scattered yellowish hairs, longer and straighter on sclerites, shorter and more curved on intersegmental membrane.

Wings densely covered with stellate papillae and short hairs.

Male, as female except for slight difference in fontanelle, slightly smaller eyes and ocellae, longer hind tibia.

	mm.
Width of head across eyes	1·47–1·67
Eye, greatest diameter	0·47–0·56
Ocellus	0·15–0·22 × 0·20–0·26
Ocellus to eye	0·03–0·04
Width of pronotum	1·33–1·57
Length of pronotum	0·89–1·00
Length of hind tibia	1·85–2·20
Length of fore wing	14·3–16·9

Described from seven females and eight males collected whilst flying.

Morphotype locality : Tanganyika, Morogoro, iii.35. (*W. V. Harris*). Morphotypes in British Museum (Natural History).

Soldiers. Agree well with original description, except for an increase in known range of variation. Nose forms an angle with rest of head capsule varying by about 15 degrees. Antennae of major soldier, about equally divided between 13 and 14 segmented, rarely 12. Minor soldier, antennae 12–13 segmented.

	Major soldier mm.	Minor soldier mm.
Head length to tip of nose	1·85–2·28	1·43–1·62
Width of head	1·07–1·50	0·57–0·64
Depth of head	0·75–1·07	0·45–0·54
Width of pronotum	0·54–0·64	0·40–0·43
Length of pronotum	0·22–0·29	0·18–0·22
Length of hind tibia	1·07–1·39	1·04–1·22

This species appears to be less variable than most of those studied. The main differences between this species and the two others most resembling it, *T. dispar* and *T. lutzi*, have already been given in the section on the former.

OTHER RECORDS. TANGANYIKA : Amani, 1950, Morogoro, Mwakijembe, Handeni, 1951, Daluni, 1952 (*P. B. Kemp*) ; Morogoro, 1937 and 1941 (*W. V. Harris*). ISLANDS : Mafia Is., 1937, Zanzibar, 1951 (*W. V. Harris*). NYASALAND : Zomba, Domasi (Namwera road) 1953 (*W. A. Sands and W. Wilkinson*).

The records from Nyasaland suggest that this species may be more widely distributed in the South, and that N. E. Tanganyika is near the limit of its range. If this is the case, the record of *T. rapulum* from Ethiopia (Rothschild, Katchinoa) probably refers to a similar but separate species.

The independent mounds of this species are small domed structures, but of nine records of nests, five were in dead stumps or logs, a habit unusual in the East African *Trinervitermes*.

ACKNOWLEDGMENTS

I wish to thank Dr. O. Lundblad for sending type material from the Sjöstedt collection of termites in the Naturhistoriska Riksmuseet, Stockholm, and the Trustees of the British Museum (Natural History) for permission to examine type material in the termite collection.

SUMMARY

Examination of material collected by the members of the Colonial Termite Research Unit has led to the conclusion that the subfamily Nasutitermitinae is represented by a comparatively small number of species in East Africa. The revised list comprises a total of 18 species, of which 9 are new to East Africa. In four species the imago is described for the first time. One species is completely redescribed, three are removed from the East African list, and two are reduced to synonyms, the reasons for this adjustment being stated.

The wide range of variation encountered in many species is described and discussed. Keys are provided to the soldiers, and to those alates known.

The distribution of the group is of interest, since the true " East African " fauna is separated from the inhabitants of the Guinean Zone, which includes most of Uganda North of the Equator.

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N. C. E. MILLER

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Pp. 29–81 ; 30 *Text-figures*

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By N. C. E. MILLER
Commonwealth Institute of Entomology, London

THE new genera and species of Reduviidae described and figured in this paper are from three sources, namely, collections sent to me for study by Mr. T. E. Woodward of the Department of Entomology, University of Queensland, Brisbane, Australia, by Mr. R. H. Carcasson, Coryndon Museum, Nairobi, Kenya and the collections of the British Museum (N.H.).

The types and paratypes are in the British Museum with the exception of a paratype each of *Dactylopodocoris agilis* gen. n., sp. n., *Magneticocoris funebris* gen. n, sp. n., *Rhopalotrichius notatus* gen. n., sp. n. and of *Ptilocnemus vittatus* sp. n. which have been sent to the University of Queensland and a paratype of *Oedemanota kenyensis* gen. n., sp. n. which has been sent to the Coryndon Museum.

I am indebted to Dr. René Malaise, Naturhistoriska Riksmuseum, Stockholm, Sweden for the loan of the type and paratype of *Fusius rubricosus* (Stål).

Sub-family HOLOPTILINAE

Ptilocnemus vittatus sp. n.

(Text-fig. 1)

COLOUR. Testaceous ; head and rostrum darker. Hemelytra whitish ; corium and base of membrane hyaline ; veins of corium testaceous ; membrane with scattered, small fuscous spots and an interrupted irregular fuscous stripe sub-basally.

STRUCTURE. Allied to *Ptilocnemus pallidus* Miller, 1950, *Ann. Mag. nat. Hist.* (12), **3** : 795, from which it differs in coloration of the hemelytra which have a transverse fuscous stripe sub-basally and in having the 2nd antennal segment irregularly and more abundantly tuberculate, the postocular relatively wider and not so abruptly narrowed to base, the costal margin of the corium very strongly concave basally and the posterolateral angles of the pronotum more strongly produced.

Total length	3·00 mm.
Hemelytra	4·00 mm.
Greatest pronotal width	1·50 mm.

SPECIMENS EXAMINED. One ♂ (holotype), Australia, S.E. Queensland, Kingaroy, 19.xii.1942, A. Gardner; 1 ♂ (paratype), Sunnybrook, 27.iii.1936, F. Chippendale; 1 ♂ (paratype), Mt. Edwards, 1.iv.1934, F. A. Perkins.

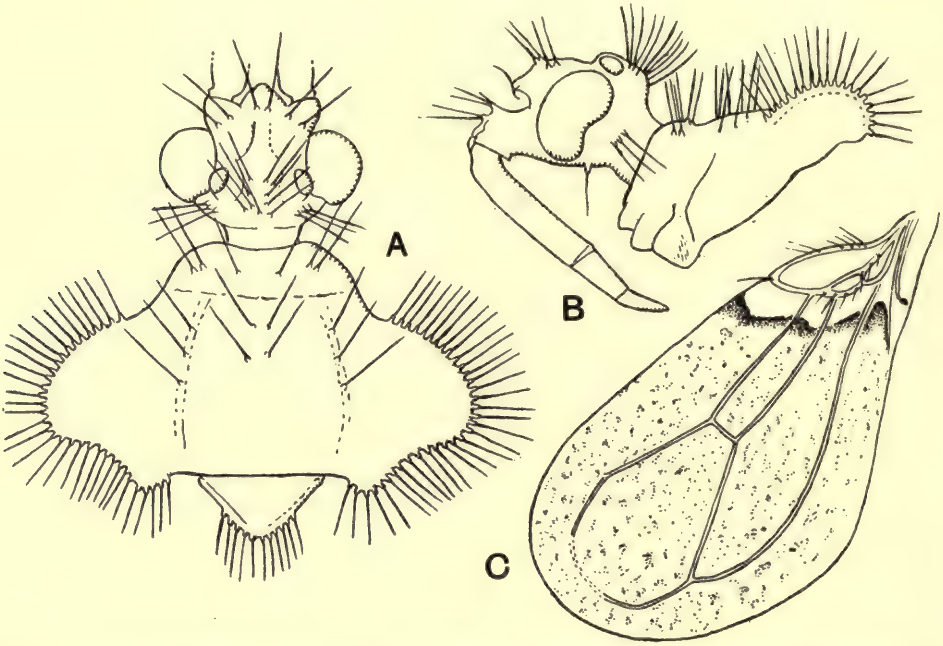

FIG. 1.—*Ptilocnemus vittatus* sp. n. A. Head, pronotum and scutellum (dorsal view); B. head and pronotum (lateral view); C. hemelytron, (lower scale of magnification than A and B).

Rhopalotrichius gen. n.*

SIZE. Very small. Antennae thick with 3 segments; segment 1 cylindrical, strongly constricted basally; segment 3 sub-equal in length to basal segment; segment 2 with setigerous tubercles. Head shorter than pronotum; laterally basally with thick, moderately long setigerous tubercles; antennophores widely separated; vertex with a bifurcate tubercle between antennophores; postocular laterally and antennophores with setigerous tubercles; eyes reniform, shorter than height of head; ocelli widely separated. Pronotum wider than long; lateral and postero-lateral margins with setigerous tubercles; posterior lobe with sub-parallel, longitudinal carinae; stridulatory furrow present. Basal segment of rostrum thick and longer than remaining segments together; segments 2 and 3 with short spines on inner surface. Costal margin of corium with setigerous tubercles. Trichome absent. Tarsi with 2 segments.

Type species: *Rhopalotrichius notatus* sp. n.

* ῥόπᾰλον = club; θριξ = seta.

Rhopalotrichius notatus sp. n.

(Text-fig. 2)

COLOUR. Testaceous. Antennae, head and legs with faint ferruginous suffusion. Anterior lobe of pronotum and a triangular spot on posterior lobe, piceous. Scutellum piceous. Hemelytra with fuscous and infumate pattern as in Text-fig. 2.

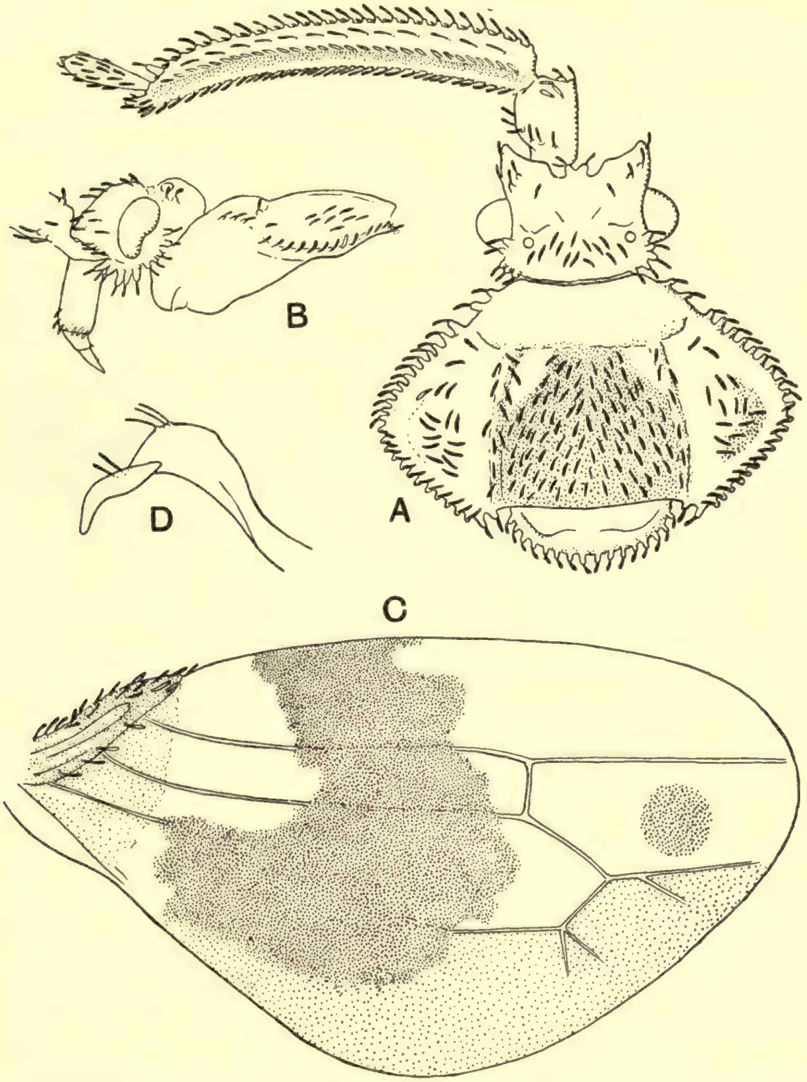

FIG. 2.—*Rhopalotrichius notatus* gen. n., sp. n. A. Head, antennae, pronotum and scutellum (dorsal view); B. head and pronotum (lateral view); C. hemelytron; D. harpago.

Corium testaceous. Setae mostly black ; basal segment of antennae with scattered white setae ; segment 2 with a regular row of white semi-imbricate setae on upper surface.

Structure. Setae on head, thorax and antennae mostly thick, curved, club-like, setae on external margin of connexivum, particularly on apical segment, long and curved. Hemelytra extending beyond apex of abdomen.

	♂	♀
Total length	3·80 mm. .	3·60 mm.
Hemelytra	3·00 mm. .	2·50 mm.
Greatest pronotal width . .	1·90 mm. .	1·60 mm.

Specimens examined. One ♀ (holotype), Australia, S.E. Queensland, Gympie, 4.ix.1947, C. Clark ; 1 ♂, 1 ♀ (paratypes), Brisbane, 2.viii.1937, A. J. S.

Sub-family STENOPODINAE

Dactylopodocoris gen. n.*

Size. Moderate. Basal segment of antennae as long as head ; segment 2 twice as long as basal segment ; apical segments filiform, together a little more than half as long as 2. Head shorter than pronotum, tuberculate ; vertex narrower than an eye ; interantennal spines present ; bucculae produced ; antennophores with a spine basally ; anteocular shorter than postocular. Rostrum thick ; basal segment longer than remaining segments together. Pronotum wider than long ; anterior lobe shorter than posterior lobe ; lateral angles of collar produced ; anterior lobe medially longitudinally sulcate ; posterior lobe with sub-dorsal carinae and with lateral and posterior margins (not postero-lateral margins) dorso-ventrally compressed ; propleura produced and spinose laterally. Scutellum with an apical spine. Abdomen mid-ventrally carinate. Legs slender ; anterior femora and trochanters with spines on lower surface ; posterior tibiae with a dense tuft of long sericeous setae on the greater part of the length.

Type species : *Dactylopodocoris agilis* sp. n.

Dactylopodocoris agilis sp. n.

(Text-fig. 3)

Colour. Testaceous. Antennae and legs pale testaceous ; anterior femora with narrow, longitudinal brown stripes. Head and thorax testaceous with ferruginous suffusion. Abdomen testaceous with connexival segments 2–6 suffused with ferruginous ; ventrally with blackish suffusion. Costal area of corium, base of clavus, veins, ferruginous ; rest of corium, membrane hyaline, faintly infumate ; clavus and membranal cells with fuscous spots. Setae on posterior tibiae pale fulvous.

* δάκτυλος = plume, ποὺς = leg, κορις = bug.

STRUCTURE. Basal segment of antennae feebly curved, somewhat thicker towards apex; segment 2 with abundant, moderately long erect setae. Inter-antennal spines slender, acute, nearly half as long as basal segment. Humeral angles sub-acute. Scutellar spine sub-acute, feebly elevated. Carinae on posterior pronotal lobe feeble; surface of lobe granulose, tuberculate. Spines on anterior femora very short, constricted apically and situated on basal two-thirds only.

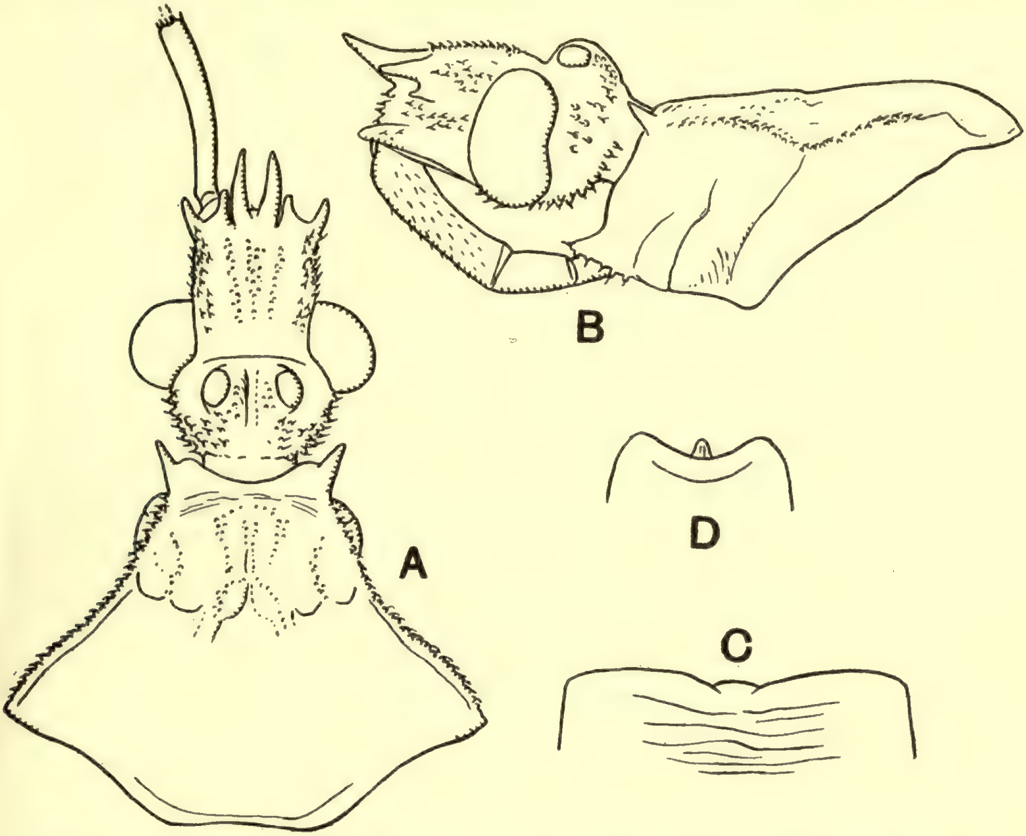

FIG. 3.—*Dactylopodocoris agilis* gen. n., sp. n. A. Head and pronotum (dorsal view); B. Head and pronotum (lateral view); C. apex of abdomen (dorsal view); D. apical margin of pygophore (terminal view).

Total length	11·00 mm.
Hemelytra	8·00 mm.
Greatest pronotal width	3·00 mm.

SPECIMENS EXAMINED. One ♂ (holotype), Australia, Queensland, Gatton, 8.ii.1937, B. F. Langdon; 1 ♂ (paratype), Biloele, 7.xii.1942, W. R. Horne; 1 ♂ (paratype), Brisbane (no collector's name or date).

This new genus with the unusual form of the posterior tibiae and the semi-hyaline corium differs from all other known genera of the Stenopodinae.

Polycentrocoris gen. n.*

Size. Small. Basal segment of antennae thick, longer than anteocular, spinose and tuberculate ; segment 2 slender, setose, tuberculate, longer than segment 1 ; segments 3 and 4 filiform, together as long as 1. Head sub-equal in length to pronotum, spinose and tuberculate ; anteocular longer than postocular and with interantennal spines ; ocelli moderately large, widely separated, nearer to eyes than to each other ; bucculae with a forwardly directed spine ; eyes prominent, shorter than height of head ; basal segment of rostrum longer than remaining segments together. Pronotum about as long as wide ; anterior lobe equal in length to posterior lobe, medially longitudinally sulcate in basal half ; both lobes spinose, the spines on disc arranged in linear fashion ; prosternum with a spine laterally ; pleura and sterna with setigerous tubercles and spines. Scutellum triangular with setigerous tubercles and disc medially longitudinally sulcate. Hemelytra extending almost to apex of abdomen ; base of costa and greater part of vein R with setigerous tubercles. External margin of connexivum with spines and setigerous tubercles ; external apical angle of segments 5, 6 and 7 produced ; abdomen midventrally carinate, sparsely setose and with setigerous tubercles near apical margin of segments. Legs slender, spinose ; tarsi with 3 segments. All spines terminated by a short, robust seta.

Type species : *Polycentrocoris turneri* sp. n.

Polycentrocoris turneri sp. n.

(Text-fig. 4)

Colour. Pale testaceous. Clavus, area between claval suture and Cu, area between Cu and M medially, membrane, hyaline ; area between M and R light red ; base of internal cell of membrane with a brown spot. Connexivum suffused with brown. Spines and tubercles white ; setae dark brown.

Structure. Interantennal spines acute, widely separated, parallel. Segment 2 of antennae with a few low tubercles basally. Basal segment of rostrum extending to posterior margin of eyes, about three times as long as remaining segments together. Anteocular with a very narrow, median longitudinal sulcus bifurcating to inner margin of antennophores ; transverse sulcus deep and behind eyes ; postocular medially longitudinally sulcate. Ocellar interspace twice as wide as an ocellus. Sulcus on disc of scutellum narrow.

Total length	11·50 mm.
Hemelytra	7·00 mm.
Greatest pronotal width (excluding spines) . .	2·00 mm.

---

* πολὺς = many ; κέντρον = spine, κοριϛ = bug.

Specimens examined. One ♂ (holotype), Australia, Queensland A. J. Turner, (B.M. 1903–125); 1 ♂ (paratype), Queensland, F. B. Dodd (B.M. 1904–28). (No precise locality for either).

The affinity of this new genus is doubtful. It differs from all other known genera of the Stenopodinae entirely in having all parts spinose and tuberculate.

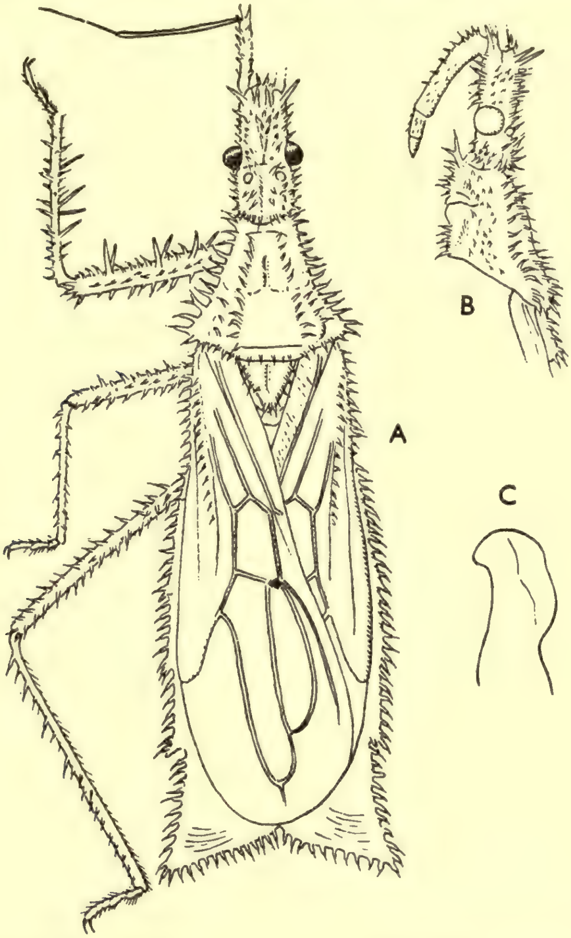

Fig. 4.—*Polycentrocoris turneri* gen. n., sp. n. A. Whole insect (dorsal view); B. head, pronotum and scutellum (lateral view); C. harpago.

Xylinocoris gen. n.*

Size Small. Dorso-ventrally compressed. Basal segment of antennae sub-equal in length to head; segment 2 longer than segment 1. Head shorter than pronotum; anteocular sub-equal in length to postocular; tylus produced apically, elevated, bifurcate; interantennal elevations present; antennophores nearer to eyes than

* *ξῠ̔λῖνος* = wooden; *κορις* = bug.

to apex of head with a tubercle basally ; vertex narrower than an eye ; ocelli large, elevated, nearer to eyes than to each other ; postocular obscurely tuberculate ; eyes longer than height of head, sub-contiguous at their lower margins ; rostrum moderately slender ; basal segment a little shorter than segments 2 and 3 together ; segment 2 sub-equal in length to 3. Pronotum wider than long ; lateral angles of collar somewhat elevated ; anterior lobe longer than posterior lobe, obscurely tuberculate laterally, medially longitudinally sulcate basally ; posterior lobe with sub-dorsal carinae ; humeral angles somewhat elevated ; anterior acetabula very prominent in dorsal view ; mesosternum medially longitudinally sulcate and depressed. Scutellum triangular ; disc not depressed ; sub-apically with a low, rounded elevation ; basally laterally with a spine. Hemelytra extending to apex of abdomen ; base of internal cell of membrane narrower than base of external cell. Abdomen ovate in outline ; external apical angle of connexival segments produced. Anterior femora incrassate with spines on lower surface ; median and posterior legs relatively short and slender.

Type species : *Xylinocoris depressus* sp. n.

Xylinocoris depressus sp. n.

(Text-fig. 5)

Colour. Dark brown. Anterior lobe of pronotum with somewhat obscure, linear black spots. Humeral angles light brown. Elevation on scutellum pale testaceous. Part of area between claval suture and Cu, discal cell, membrane, sub-hyaline, stramineous, infumate ; apex of corium pale testaceous ; extreme apex brown. Abdomen ventrally with piceous suffusion enclosing small testaceous spots.

Structure. Segment 2 of antennae about one-half longer than 1. Ocellar interspace nearly twice as wide as an ocellus. Interantennal elevations very feeble. Head, pronotum and scutellum shagreened or granular ; posterior lobe of pronotum mostly transversely rugulose ; carinae on posterior lobe a little less than half as long as lobe. Basal lateral spine on scutellum short, sub-conical. Base of internal cell of membrane about one-third as wide as base of external cell. Anterior femora with very many short spines and a few somewhat longer spines on lower surface ; apical segment of anterior tarsi three times as long as basal segment.

Total length	12·00 mm.
Hemelytra	9·00 mm.
Greatest pronotal width	3·30 mm.

Specimen examined. One ♂ (holotype), Madagascar, Antananarivo, (Distant coll. B.M. 1911–383).

A genus the affinity of which is doubtful. Differs from all other known genera in the structure of the head, the tylus being elevated and bifurcate, the anterior bucculae very prominent and in the unusual structure of the scutellum.

Sub-family REDUVIINAE

Tiarodes rusticus Distant, 1919, *Entomologist*, **52** : 245.

This species does not belong to *Tiarodes*. The following new genus is erected to receive it.

Neotiarodes gen. n.

SIZE. Moderate. Head sub-equal in length to pronotum ; antennophores equidistant from eyes to apex of head. Basal segment of antennae short, not extending to apex of head, one-fifth as long as segment 2 ; juga rounded, truncate apically ; ocelli widely separated. Basal segment of rostrum longer than segments 2 and 3 together ; basal segment extending a little beyond anterior margin of eyes. Posterior lobe of pronotum longer than anterior lobe, both lobes medially longitudinally sulcate and depressed ; prosternum with a conical elevation laterally. Scutellum wider than long ; apex produced. Internal cell of membrane wider at base than external cell ; hemelytra extending beyond apex of abdomen. Legs relatively slender ; anterior and median tibiae with a fossula spongiosa.

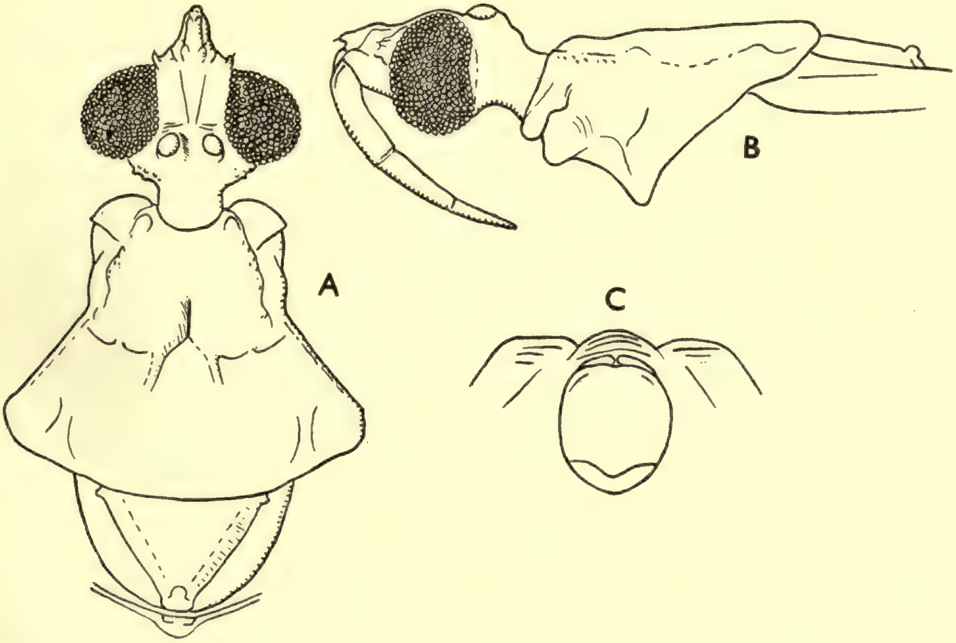

FIG. 5.—*Xylinocoris depressus* gen. n., sp. n. A. Head, pronotum, scutellum and post-scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. apex of abdomen (ventral view).

Type species : *Tiarodes rusticus* Distant.

Neotiarodes rusticus (Distant)

(Text-fig. 6)

Colour. Antennae and rostrum piceous. Head and thorax black with a violaceous lustre. Corium black with a large, suffused reddish spot apically; membrane infumate; veins of external cell basally yellowish. Segments 2–5 of abdomen dorsally reddish; connexivum of segment 5, segments 6 and 7 piceous with a faint violaceous lustre; segments 2 and 3, segments 4 and 5 midventrally reddish; remainder piceous with faint violaceous lustre. Coxae and trochanters piceous; femora light red, narrowly piceous with a violaceous lustre apically; anterior and median tibiae reddish suffused with piceous; posterior tibiae piceous; tarsi dark brown.

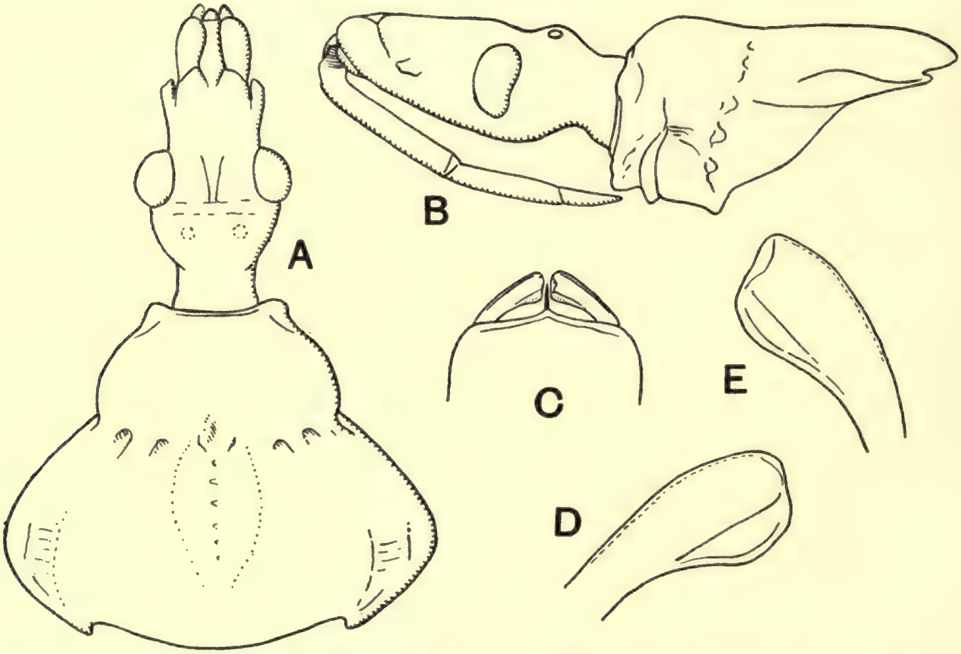

Fig. 6.—*Neotiarodes rusticus* (Distant) gen. n. A. Head and pronotum (dorsal view); B. Head and pronotum (lateral view); C. pygophore (terminal view); D. right harpago; E. left harpago.

Structure. Segment 2 of antennae with abundant, moderately long, erect setae. Vertex somewhat obscurely transversely striate. Ocellar inter-space nearly twice as wide as space between an ocellus and an eye. Both lobes of pronotum glabrous; posterior lobe foveolate anteriorly; lateral sulci very obscurely foveolate; median sulcus wide, deep, foveolate. Scutellar spine narrowly rounded and curved downwards apically.

Total length	20·00 mm.
Hemelytra	14·00 mm.
Greatest pronotal width	6·00 mm.

SPECIMEN EXAMINED. One ♂ (holotype) Indo China, Tonkin, Chapa, June 1916, R. V. de Salvaza, (B.M. 1918–1).

Neotiarodes differs from *Tiarodes* in the somewhat elongate habitus and in having the 2nd antennal segment about five times as long as the basal segment, the basal rostral segment extending beyond the anterior margin of the eyes, the transverse sulcus on the vertex not well defined and situated behind the eyes, the posterior lobe of the pronotum longer than the anterior lobe, the transverse sulcus between lobes less strongly foveolate, the median sulcus and depression on lobes less deep but wider, the legs relatively longer, the femora less strongly incrassate and without sulci on the outer lower surface, the tibiae less strongly incrassate apically, the fossula spongiosa on tibiae one fifth as long as tibia and the tarsi relatively longer and more slender.

Durganda pedestris Distant 1919, *Entomologist*, **52** : 245. This species belongs to *Tiarodurganda* Breddin, 1903, *S.B. Ges. Naturfr. Berlin* : 112.

Durganda formidabilis Distant, 1919, *Entomologist*, **52** : 245. This species does not belong to *Durganda* Amyot & Serville, 1843, *Hist. nat. Ins. Hém.* : 340.

Differs in general habitus, being much less strongly dorso-ventrally compressed and in having the basal antennal segment extending beyond the apex of the head, the juga rounded apically and not widely separated, the basal rostral segment extending to anterior margin of eyes and subequal in length to remaining segments together (in *Durganda* the basal segment is about half as long as anteocular and is shorter than segment 2), the anterior and posterior pronotal lobe not transverse and flattened, the anterior acetabula are hardly visible from above, the anterior femora have a single row of spines. The prosternum as in *Durganda* is not transversely striate.

The following new genus is established for it :

Durgandana gen. n.

SIZE. Small. Somewhat compressed dorso-ventrally. Basal segment of antennae short, extending beyond apex of head ; segment 2 a little less than twice as long as basal segment. Head sub-equal in length to pronotum ; anteocular longer than postocular, the latter strongly transversely globose and with a distinct neck ; vertex wider than an eye ; ocelli widely separated ; basal segment of rostrum longer than remaining segments together, extending to anterior margin of eyes. Anterior lobe of pronotum sub-equal in length to posterior lobe, medially sulcate and with oblique sulci ; posterior lobe medially longitudinally sulcate ; sulcus between lobes foveolate; lateral angles of collar produced. Scutellum wider than long ; apex produced. Hemelytra extending beyond apex of abdomen ; costal margin of corium somewhat concave ; base of external cell of membrane wider than base of internal cell. Anterior femora incrassate and with spines on lower surface ; anterior and median tibiae with a fossula spongiosa ; median and posterior legs widely separated ; anterior tibiae somewhat incrassate and compressed apically.

Type species : *Durganda formidabilis* Distant,

Durgandana formidabilis (Distant)

(Text-fig. 7)

COLOUR. Testaceous. Corium reddish; part of clavus, area between claval suture and Cu suffused with fuscous; membrane fuscous. Abdomen dorsally suffused with dark brown; connexival segments 5–7 partly black. The corium in the female has a black suffusion.

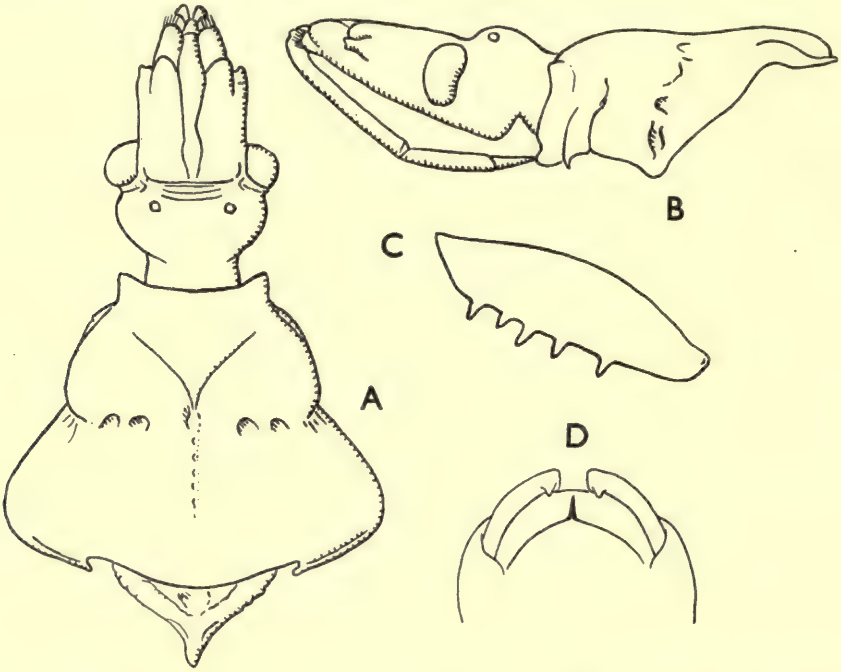

FIG. 7.—*Durgandana formidabilis* (Distant) gen. n. A. Head, pronotum and scutellum (dorsal view); B. head and pronotum (lateral view); C. anterior femur; D. pygophore (dorsal view).

STRUCTURE. Anteocular feebly transversely striate; postocular with arcuate striae in front of ocelli; vertex about twice as wide as an eye; ocellar interspace nearly twice as wide as space between an ocellus and an eye. Lateral angles of collar conical; sulcus between collar and rest of lobe obsolete. Base of external cell of membrane twice as wide as base of internal cell. Anterior femora with 5 moderately long spines on lower surface. Fossula spongiosa on tibiae about one-quarter as long as tibia.

	♂	♀
Total length	11·00 mm.	14·00 mm.
Hemelytra	9·00 mm.	9·00 mm.
Greatest pronotal width	3·50 mm.	3·50 mm.

SPECIMENS EXAMINED. One ♂ (holotype), Indo China, Tonkin, June 1917; 1 ♂ (paratype), Annam, Keng Trap, May 1917; 1 ♀ (paratype), Laos, Tintoe, 1.xi.1918; 2 ♀ (paratypes), Xien Khouang, Ban Sai, 26.xi.1917, R. V. de Salvaza.

Australocleptes Miller

Miller, 1951, *Ann. Mag. nat. Hist.* (12), **4** : 945.

Key to species.

1. Lateral angles of collar directed outwards ; sulci and median depression on posterior pronotal lobe with few, widely spaced, transverse sulci ; colour pattern on pronotum feeble . . . . *debilis* (Walker)
–. Lateral angles of collar directed forwards ; sulci and median depression on posterior pronotal lobe with many narrowly spaced, transverse sulci ; colour pattern on pronotum well-defined 2
2. Interantennal elevations widely divergent apically . . . . . *hackeri* sp. n.
–. Interantennal elevations narrowly divergent apically . . . . *ereptor* sp. n.

Australocleptes hackeri sp. n.

(Text-fig. 8)

COLOUR. Testaceous. Basal segment of antennae, head with brown suffusion ; base of head dark brown ; vertex with an arcuate fuscous spot from base of antennophores to transverse sulcus. Segments 1 and 2 of rostrum piceous ; segment 3 testaceous. Pronotum testaceous with piceous pattern as in Text-fig. 8. Propleura piceous

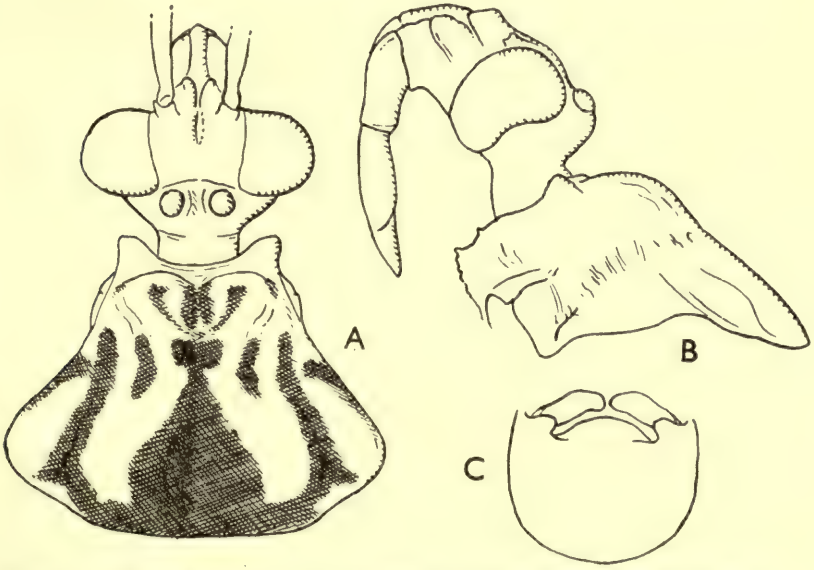

FIG. 8.—*Australocleptes hackeri* sp. n. A. Head and pronotum, (dorsal view) ; B. head and pronoum, (lateral view) ; C. pygophore, (terminal view).

except acetabula and epimeron testaceous; meso- and metapleura piceous; acetabula testaceous. Scutellum testaceous with depression and spine piceous. Hemelytra dark brown with base and an irregular median, transverse spot testaceous; membrane infumate. Abdomen testaceous with an irregular, longitudinal stripe ventro-laterally and a spot at apex of connexival segments dark brown. Legs testaceous; femora with a very wide median and a very narrow sub-apical annulation dark brown; tibiae almost entirely suffused with brown and with a narrow sub-basal piceous annulation.

Structure. Interantennal elevations widely divergent apically; median sulcus on vertex shallow. Ocellar interspace deeply sulcate, somewhat less wide than an ocellus. Depression and sulci on posterior pronotal lobe deeply transversely sulcate. Scutellar spine broken, apparently horizontal. Fossula spongiosa sub-equal in length to 2nd tarsal segment.

Total length	10·50 mm.
Hemelytra	7·50 mm.
Greatest pronotal width	2·90 mm.

Specimen examined. One ♂ (holotype), Australia, Queensland, Brisbane, 26.x.1915, H. Hacker (B.M. 1924–455).

Australocleptes ereptor sp. n.

(Text-fig. 9)

Colour. Antennae, head, pleura, (except propleural epimeron and acetabula), sterna, piceous. Pronotum testaceous with piceous pattern as in Text-fig. 9. Scutellum testaceous with depression and apical spine piceous. Propleural epimeron, acetabula testaceous. Corium testaceous with apex and an irregular median spot fuscous; membrane dark infumate. Abdomen testaceous, strongly suffused with dark brown; each segment of connexivum with an apical spot, pygophore, piceous. Legs testaceous; tibiae with a somewhat obscure wide, brown annulation and base narrowly piceous; femora with a wide, interrupted sub-median annulation and apex narrowly piceous; coxae and trochanters testaceous, the former suffused with piceous; tarsi testaceous.

Structure. Interantennal elevations narrowly divergent apically. Median sulcus on vertex deep, bifurcate; ocellar interspace deeply sulcate, about twice as wide as an ocellus. Depression and sulci on posterior pronotal lobe transversely sulcate. Scutellar spine sub-horizontal. Fossula spongiosa sub-equal in length to 2nd tarsal segment.

Total length	13·00 mm.
Hemelytra	10·00 mm.
Greatest pronotal width	3·40 mm.

Specimen examined. One ♂ (holotype), Australia, Queensland, nr. Killarney, 8.xii.1948 (at light—no collector's name), (B.M. 1950–18).

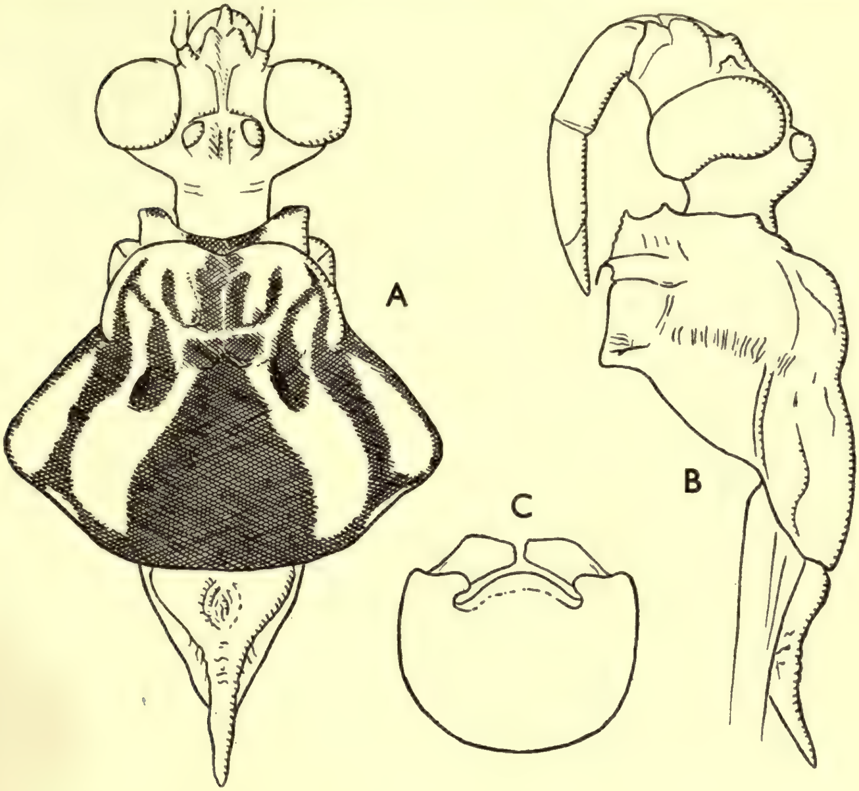

FIG. 9.—*Australocleptes ereptor* sp. n. A. Head, pronotum and scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. pygophore (terminal view).

Neokhafra gen. n.

SIZE. Large. Basal segment of antennae sub-equal in length to anteocular, one-third as long as segment 2. Head shorter than pronotum ; anteocular subequal in length to postocular with bifurcate inter-antennal elevations and upper margin of genae carinate ; vertex wider than an eye, feebly sulcate ; eyes reniform, shorter than height of head ; ocelli moderately large, widely separated ; basal segment of rostrum shorter than segment 2. Pronotum wider than long, smooth ; anterior lobe more or less transverse shorter than posterior lobe, sulcate medially basally ; posterior lobe with shallow, median, longitudinal foveolate sulcus ; anteriorly with short, longitudinal carinulae ; lateral sulci foveolate. Disc of scutellum wider than long ; apex produced. Hemelytra extending to apex of abdomen ; base of internal cell of membrane wider than base of external cell. Anterior and median femora moderately incrassate, unarmed ; anterior and median tibiae with a fossula spongiosa. Sub-apical process of pygophore acute.

Type species : *Cerilocus bicolor* Distant.

Neokhafra bicolor (Distant)

(Text-fig. 10)

Colour. Testaceous. Femora faintly suffused with red apically. Corium strongly suffused with black; membrane dark infumate. Abdomen ventrolaterally basally suffused with brown; segments 6 and 7 of connexivum dorsally pale.

Structure. Vertex about twice as wide as an eye with a very shallow and narrow Y-shaped sulcus; ocellar interspace about twice as wide as an ocellus and a little narrower than space between an ocellus and an eye. Oblique and arcuate

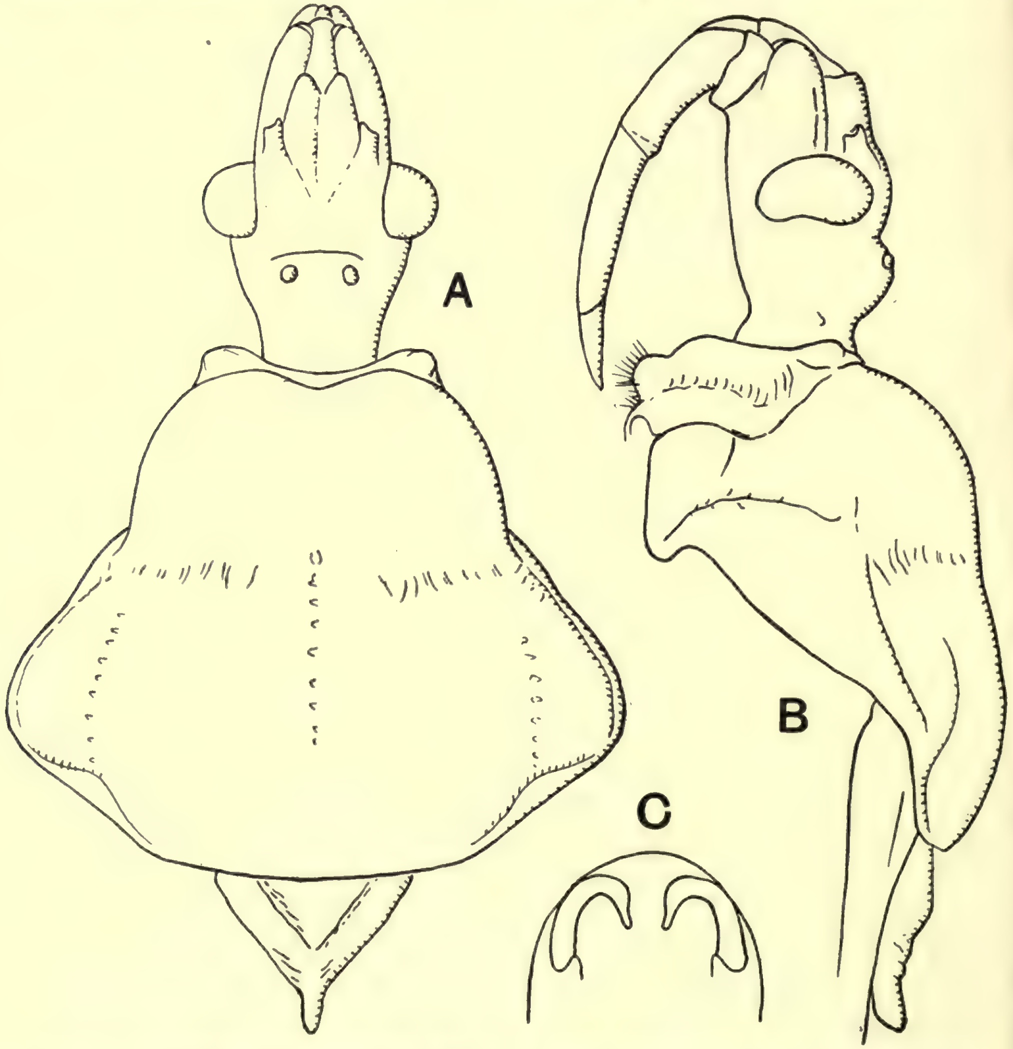

Fig. 10.—*Neokhafra bicolor* (Distant), gen. n. A. Head, pronotum and scutellum (dorsal view); B. head, pronotum and scutellum (lateral view); C. pygophore (dorsal view).

sulci on anterior pronotal lobe very feeble; foveoles in sulcus on posterior lobe transverse; base of median sulcus on anterior lobe very deep. Scutellar spine truncate and laterally compressed. Fossula spongiosa on anterior tibiae one-third as long, on median tibiae one-fourth as long as tibia.

Total length	24·00 mm.
Hemelytra	15·50 mm.
Greatest pronotal width	7·00 mm.

Specimen examined. One ♂ (holotype), S. Rhodesia, Salisbury, G. A. K. Marshall; (Distant coll. B.M. 1911–383).

In general habitus *Neokhafra* resembles *Khafra* Distant, 1902, *Ann. Mag. nat. Hist.* (7), **10** : 185, but it differs from it in having the basal antennal segment one-third as long and not one-quarter as long as segment 2, the vertex relatively wider, the 3rd rostral segment much shorter and not sub-equal in length to segment 2, the anteocular sub-equal in length and not considerably longer than postocular, the humeral angles without a projection, the scutellar spine, thick, horizontal, not slender, acute and oblique, the prosternum with a conical elevation laterally, the anterior and median femora relatively thicker and the fossula spongiosa one-third and one-quarter as long as tibia, not half as long. Segment 2 and the greater part of segment 3 of the abdomen mid-ventrally in *Khafra* are carinate.

Neokhafra differs from *Cerilocus* (in which this species had been placed by Distant) in having the basal antennal segment as long as anteocular, the vertex considerably wider than an eye, the basal rostral segment extending to the anterior margin of the eyes, segment 2 longer than basal segment, the ocelli small and widely separated, the transverse sulcus on the vertex situated behind eyes, the postocular feebly globose immediately behind eyes then narrowed to base, the scutellar spine truncate and laterally compressed and the femora without spines.

Neokhafra humeralis sp. n.

(Text-fig. 11)

Differs from *Neokhafra bicolor* (Distant), in somewhat smaller size, coloration and genitalia. It differs in coloration principally in having the humeral angles and the posterior area of the pronotum suffused with fuscous. In structure it differs in having the anterior margin of the produced parts of the collar much less rounded, the apex of the scutellar spine angulately truncate and the transverse sulcus on the pronotum much less strongly carinulate.

	♂	♀
Total length	23·00 mm.	21·50 mm.
Hemelytra	14·00 mm.	14·00 mm.
Greatest pronotal width	6·50 mm.	6·50 mm.

Specimens examined. One ♂ (holotype), Uganda, Bugomolo, 24.iv.1927, H. Hargreaves; 1 ♀, Kampala, 19.iv.1937, G. H. E Hopkins.

Ovum. Ovate, glabrous. Testaceous; operculum whitish, 1·80 mm. (dissected).

Khafrana gen. n.

SIZE. Moderate. Basal segment of antennae sub-equal in length to anteocular and extending beyond apex of head ; segment 2 three times as long as segment 1 ; anteocular sub-equal in length to postocular, the latter moderately globose, constricted in basal half ; anteocular with interantennal elevations ; vertex wider than an eye with a Y-shaped sulcus ; ocelli moderately large, widely separated ; eyes much shorter than height of head. Basal segment of rostrum shorter than segment 2. Pronotum as wide as long ; anterior lobe medially sulcate in basal half ; posterior lobe medially sulcate for two-thirds of its length, the sulcus concurrent with sulcus on anterior lobe and foveolate ; area on each side of sulcus somewhat depressed and transversely sulcate ; lateral sulci present. Scutellum wider than long with apex produced and with a basal lateral spine ; produced portion laterally compressed and

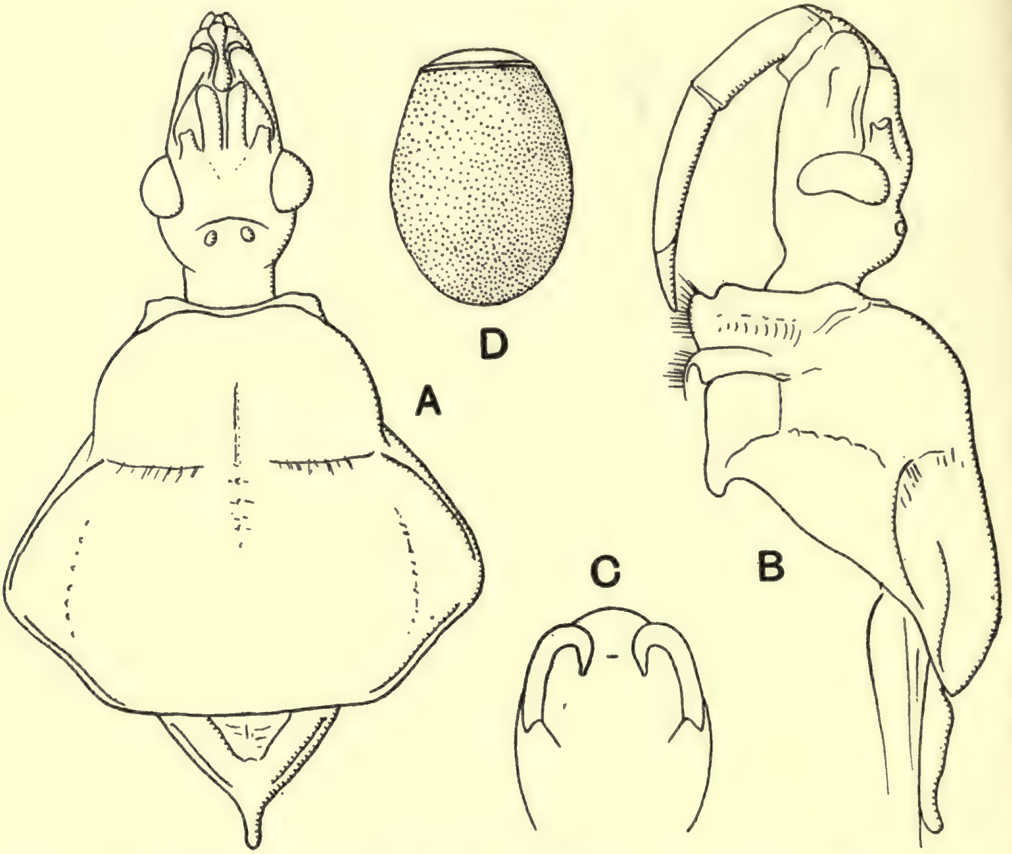

FIG. 11.—*Neokhafra humeralis* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. pygophore (dorsal view) ; D. ovum.

somewhat elevated. Hemelytra not extending to apex of abdomen ; base of external cell of membrane equal in width to base of internal cell. Prosternum with an elevation laterally ; metasternum medially longitudinally carinate Anterior and median femora moderately incrassate ; anterior and median tibiae with a fossula spongiosa.

Type species : *Khafrana nigeriensis* sp. n.

Khafrana nigeriensis sp. n.

(Text-fig. 12)

COLOUR. Piceous. Segment 2 of antennae testaceous. Postocular with an obscure yellowish spot laterally. Corium with a median, circular yellow spot which extends somewhat into internal cell of membrane. Segments 6 and 7 of connexivum

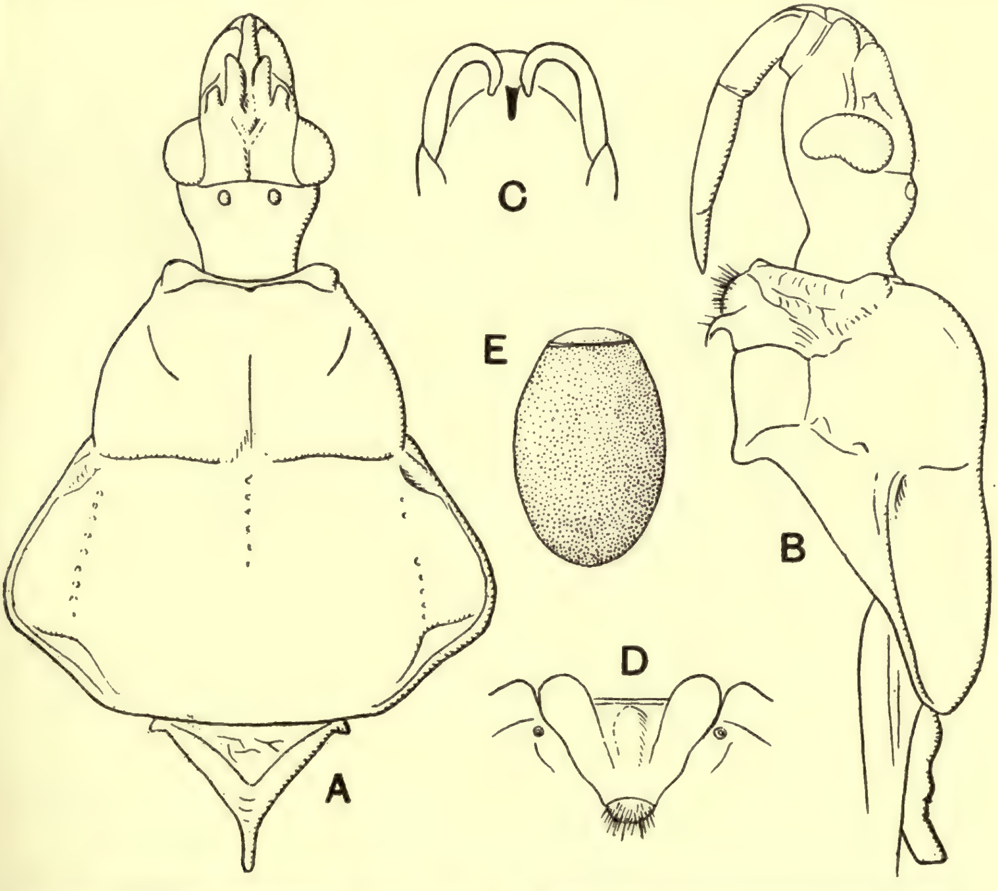

FIG. 12.—*Khafrana nigeriensis* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. pygophore, (dorsal view) ; D. apex of abdomen ♀ (ventral view) ; E. ovum.

with a small yellowish spot basally. Legs piceous; anterior and median tibiae with brown suffusion apically, femora with a wide sub-apical yellow annulation; tarsi testaceous.

STRUCTURE. Interantennal elevations widely bifurcate anteriorly; median sulcus on vertex deep. Ocellar interspace equal in width to space between an ocellus and an eye. Lateral sulci on posterior pronotal lobe obscurely transversely foveolate. Scutellar spine truncate apically. Fossula spongiosa on tibiae a little more than one-third as long as tibia.

	♂	♀
Total length	25·00 mm.	22·00 mm.
Hemelytra	14·50 mm.	14·00 mm.
Greatest pronotal width	7·00 mm.	6·00 mm.

SPECIMENS EXAMINED. One ♂ (holotype), 2 ♀ (paratypes), N. Nigeria, Bornu, Maiduguri, Mrs. Newman, (B.M. 1950–33).

OVUM. Yellowish brown; operculum whitish. Ovate, glabrous. 1·70 mm. (dissected).

Allied to *Neokhafra* gen. n. with which it agrees in general habitus, but it differs in having the eyes hardly at all prominent, the transverse sulcus on the vertex between and not behind the eyes, the anterior lobe of the pronotum relatively longer and without sulci, the pronotum as wide and not wider than long with the posterior lobe somewhat depressed medially, the scutellar spine somewhat elevated, the corium glabrous with the veins more defined and the median process of the pygophore much nearer to the apical margin.

Cerilocus Stål

Stål, 1858, *Öfv. Svenska Vet-Ak. Förh.*: 443.

The genus *Cerilocus* as at present constituted is not a natural group, containing as it does five species which have been placed in it incorrectly. These species are: *conradti* Varela 1903, *Bol. Soc. esp. Hist. nat.* **3**: 105; *parvus* Distant 1903, *Ann. S. Afr. Mus.*, **131**: 47; *bicolor* Distant 1903, (*loc. cit.*): 46; *inermipes* Stål 1859; *loc. cit.* 187 and *lydenburgi* (Distant) (*loc. cit.*): 44–46.

Correctly placed in the genus are the species *ochraceipes* Villiers and *rugosus* Villiers 1944, *Bull. Mus. Paris* 2è sér. **16**: 123, 124, *histrio* Distant 1903, *Ann. Mag. Nat. Hist.* (vii) **10**: 188, *dohrni* Stål 1858 (*loc. cit.*), 443; *karschi* Breddin 1903, *S. B. Ges. Naturfr. Berlin*; 114, *cameronensis* Varela 1903 (*loc. cit.*) and *nero* Stål 1858 (*loc. cit.*): 443.

There are, however, a few minor morphological differences in respect of the species *histrio, karschi, cameronensis* and *nero* but they are not sufficiently marked to justify further splitting of the genus. I have not seen *ochraceipes, rugosus* and *karschi*.

I propose the following new genera *Neocerilocus* for *Cerilocus inermipes*, *Paracerilocus* for *C. conradti*, *Anacerilocus* for *C. parvus* and *Lydenburgia* for *C. lydenburgi*.

Neocerilocus gen. n.

SIZE. Large. Basal segment of antennae not extending to apex of head. Anteocular longer than postocular ; vertex wider than an eye ; eyes shorter than height of head ; anteocular with interantennal elevation ; vertex medially sulcate ; ocelli small, widely separated. Rostrum thick ; basal segment a little longer than segment 2. Pronotum wider than long ; posterior lobe longer than anterior lobe, laterally sulcate ; both lobes with a median longitudinal sulcus ; transverse sulcus foveolate ; prosternum produced posteriorly, the apex curved downwards ; anterior margin produced. Scutellum wider than long ; apex produced. Hemelytra extending beyond apex of abdomen. Harpagones exposed. Anterior and median femora strongly incrassate ; anterior and median tibiae with a fossula spongiosa. Metasternum longitudinally carinate.

Type species : *Cerilocus inermipes* Stål.

Neocerilocus inermipes (Stål)

(Text-fig. 13)

COLOUR. Basal segment of antennae, head, rostrum, thorax (except posterior pronotal lobe), legs, black ; postocular with an obscure yellowish spot laterally. Posterior pronotal lobe, corium, dark yellow ; clavus (except basal half), internal basal area of membrane, pale yellow ; rest of membrane dark infumate. Abdomen dorsally brown ; ventrally black, except laterally yellow ; connexivum yellow.

STRUCTURE. Inter-antennal elevation broadly bifurcate ; median sulcus wider posteriorly, shallow ; vertex with a narrow Y-shaped sulcus. Ocellar interspace about three times as wide as an ocellus, wider than space between an ocellus and an eye. Anterior lobe of pronotum with obscure irregular depressions ; base strongly depressed medially ; posterior lobe with small transverse foveoles in median depression ; lobe very feebly depressed laterally and with very obscure foveoles within depression. Scutellar spine somewhat compressed laterally ; fossula spongiosa on tibiae a little less than half as long as tibia.

	♂	♀
Total length	24·00 mm. .	24·00 mm.
Hemelytra	15·00 mm. .	16·00 mm.
Greatest pronotal width . .	7·00 mm. .	7·50 mm.

SPECIMENS EXAMINED. One ♂ (holotype), Gold Coast (no precise locality), Kirkaldy coll. (B.M. 1912–513) ; 1 ♀ (paratype), Cameroons (no precise locality), Escalera, (B.M. 1903–355).

Also recorded from the Ivory Coast, Spanish Guinea, Gabon, Belgian Congo.

OVUM. Yellowish brown ; differentiated portion of chorion, operculum, whitish. Ovate, glabrous ; operculum feebly convex, 2·00 mm. (dissected).

Neocerilocus differs from *Cerilocus* in having the basal antennal segment short and not extending to the apex of the head, the eyes shorter than the height of the head, the vertex wider than an eye, the ocelli relatively small and nearer to eyes than

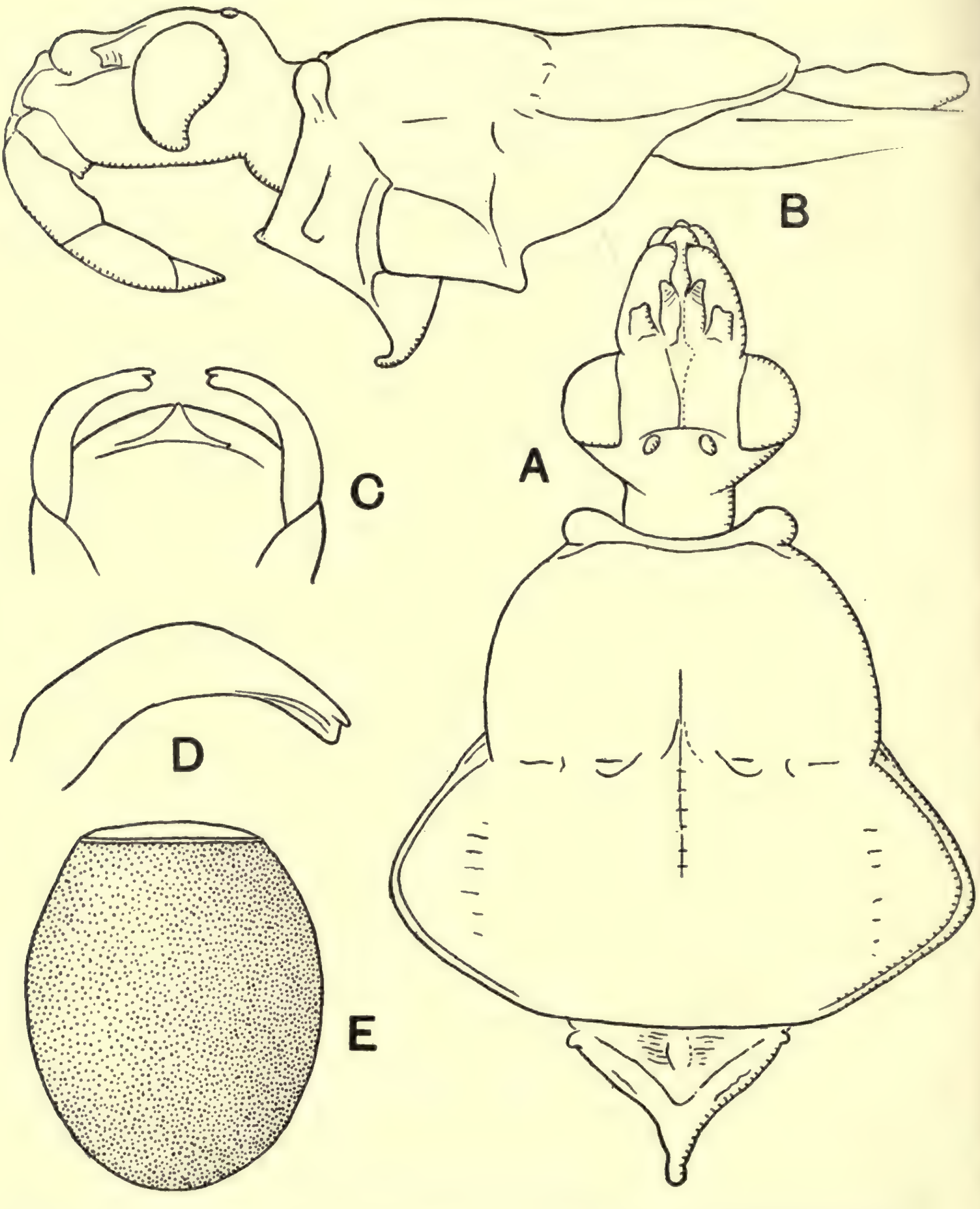

FIG. 13.—*Neocerilocus inermipes* (Stål), gen. n. A. Head, pronotum and scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. pygophore, (dorsal view) ; D harpago ; E. ovum.

to each other, the scutellar spine somewhat compressed laterally, the anterior and median femora without spines on the lower surface, the metasternum with a median, longitudinal carina extending over the entire segment and the harpagones exposed.

Paracerilocus gen. n.

SIZE. Large. Basal segment of antennae short, extending beyond apex of head. Rostrum thick; basal segment not extending to anterior margin of eyes, sub-equal in length to segment 2. Anteocular longer than postocular; eyes much shorter than height of head; vertex wider than an eye; ocelli relatively small, widely separated. Pronotum wider than long; posterior lobe sub-equal in length to anterior lobe. Prosternum produced backwards with apex curved downwards. Scutellum wider than long with a basal lateral spine and apex produced. Hemelytra extending beyond apex of abdomen. Harpagones exposed. Anterior and median tibiae moderately incrassate apically and with a fossula spongiosa; anterior and median femora with spines on lower surface. Metasternum without a median longitudinal carina.

Type species: *Cerilocus conradti* Varela.

Paracerilocus conradti (Varela)

(Text-fig. 14)

COLOUR. Basal segment of antennae, head, rostrum, anterior lobe of pronotum, scutellum, black; pleura, sterna, legs piceous; anterior and median femora with a little more than half basally yellowish; posterior femora narrowly suffused with yellow basally. Posterior lobe of pronotum, corium, yellow, the latter with a median, circular, somewhat suffused, piceous spot. Segments 2–4 of antennae, tarsi, testaceous. Abdomen light brown with suffusion ventro-laterally and pygophore black.

STRUCTURE. Inter-antennal elevation somewhat obscurely bifurcate; median sulcus on vertex narrow and with an oblique, shallow depression on each side anteriorly. Ocellar interspace about three times as wide as an ocellus; ocelli not very distinct. Anterior lobe of pronotum with a shallow, arcuate depression anteriorly; sub-lateral sulci on posterior lobe very feeble and with feeble, transverse foveoles. Basal lateral spines on scutellum short, rounded. Produced portion of prosternum rounded apically. Anterior femora with 3 short spines on inner lower margin and 2 on outer lower margin; median femora with 2 short spines on inner lower margin and 3 on outer lower margin. Fossula spongiosa on tibiae about one-third as long as tibia. Harpagones very slightly exposed.

	♂	♀
Total length	22·50 mm.	23·50 mm.
Hemelytra	17·00 mm.	18·00 mm.
Greatest pronotal width	5·80 mm.	6·00 mm.

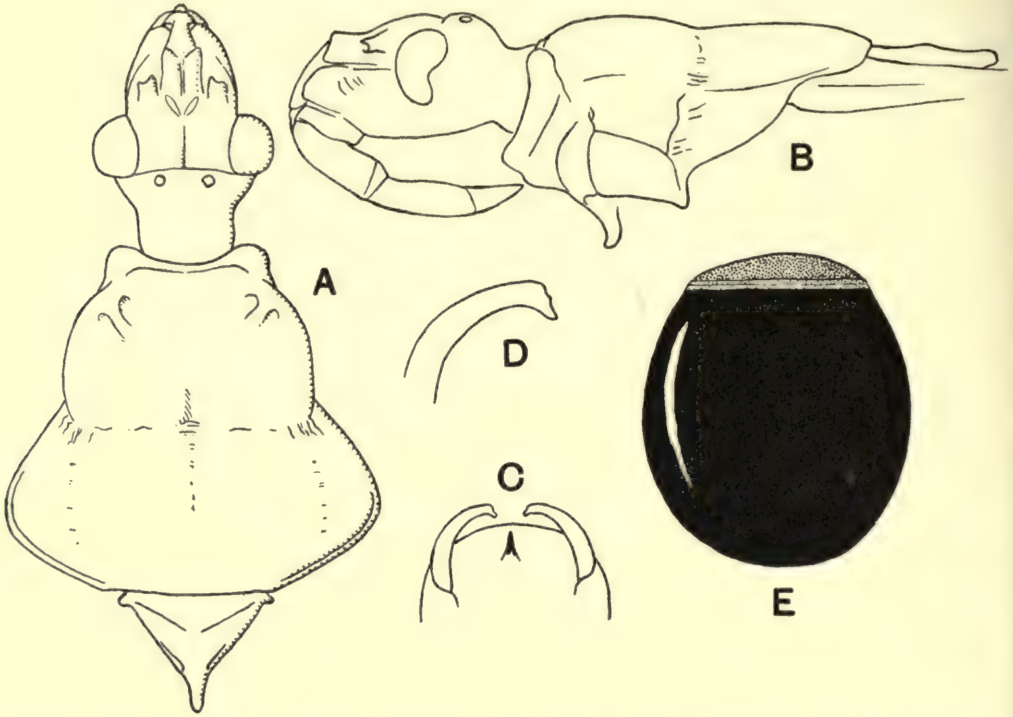

FIG. 14.—*Paracerilocus conradti* (Varela), gen. n. A. Head, pronotum and scutellum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. pygophore (dorsal view) ; D. harpago ; E. ovum.

SPECIMENS EXAMINED. One ♂ (holotype), 2 ♀ (paratypes), Cameroons (no precise locality), Escalera (B.M. 1903–355). Also recorded from Fernando Poo.

OVUM. Chorion black ; operculum greyish ; differentiated portion of chorion whitish. Glabrous ; sub-spherical ; differentiated portion of chorion narrow 2·30 mm. (dissected).

Paracerilocus differs from *Cerilocus* in having the eyes much shorter than the head, the vertex wider than an eye, the ocelli relatively small, nearer to eyes than to each other, the pronotum a little wider than long with the anterior lobe sub-equal in length to posterior lobe, the scutellum wider than long, the harpagones slightly exposed and the metasternum without a longitudinal carina.

Anacerilocus gen. n.

SIZE. Moderate. Basal segment of antennae short, sub-equal in length to anteocular ; segment 2 much longer than basal segment. Head shorter than pronotum ; anteocular sub-equal in length to postocular, the latter with a distinct neck ; vertex narrower than an eye ; ocelli large, elevated ; eyes longer than height of head and narrowly separated at their lower margins ; anteocular with a bifurcate interantennal elevation. Rostrum relatively slender ; basal segment extending to anterior margin of eyes, sub-equal in length to segment 2 ; segment 3 more than half as long as segment 2. Pronotum wider than long ; anterior lobe shorter than posterior lobe with arcuate sulci and a median longitudinal sulcus ; posterior lobe medially and laterally sulcate. Scutellum longer than wide with a basal lateral spine and apex produced ; disc excavate. Hemelytra extending to apex of abdomen. Anterior and median femora moderately incrassate ; anterior and median tibiae with a fossula spongiosa. Prosternum with a conical projection laterally ; metasternum with a median longitudinal carina.

Type species : *Cerilocus parvus* Distant.

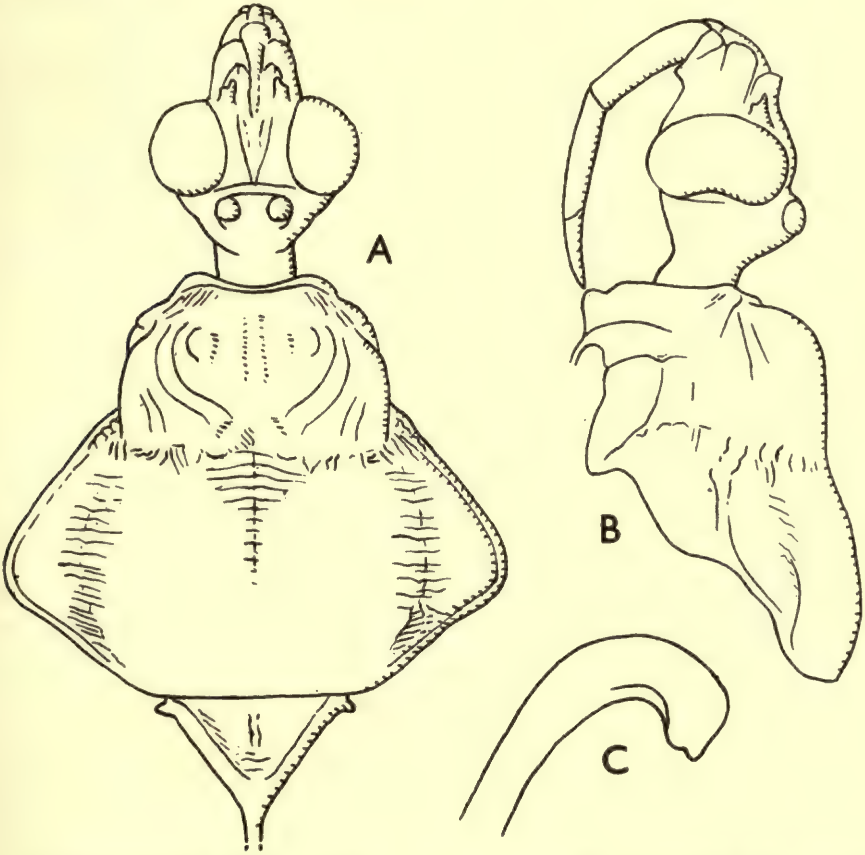

FIG. 15.—*Anacerilocus parvus* (Distant), gen. n. A. Head, pronotum and scutellum (dorsal view) ; B. head and pronotum (lateral view) ; C. harpago.

Anacerilocus parvus (Distant)

(Text-fig. 15)

COLOUR. Brown. Rostrum and tarsi testaceous. Corium with a large subcircular yellow spot extending into base of internal membranal cell ; membrane dark infumate.

STRUCTURE. Segment 2 of antennae a little more than four times as long as basal segment. Interantennal elevation widely bifurcate. Vertex obscurely rugose; space between lower margins of eyes a little wider than base of 2nd rostral segment. Ocellar interspace somewhat narrower than an ocellus and a little wider than space between an ocellus and an eye. Posterior lobe of pronotum anteriorly transversely rugose. Lateral margin of abdomen thickened.

Total length	18·00 mm.
Hemelytra	11·00 mm.
Greatest pronotal width	4·60 mm.

SPECIMEN EXAMINED. One ♂ (holotype), S. Africa, Transvaal, Lydenburg (Distant coll. B.M. 1911–383). *Anacerilocus* differs from *Cerilocus* in having the eyes longer than the height of the head and with their lower margins narrowly separated, the vertex feebly sulcate, the rostrum relatively slender with the basal segment extending to the anterior margin of the eyes and segment 3 more than half as long as segment 2, the connexivum very narrow, the lateral margins of the abdomen ventrally thickened, the harpagones exposed, the prosternum not produced posteriorly and with a conical elevation laterally, the anterior femora without spines on lower surface and the metasternum with a median carina.

Lydenburgia gen. n.

SIZE. Moderate. Setose. Basal segment of antennae shorter than anteocular but extending beyond apex of head, half as long as segment 2. Head shorter than pronotum; anteocular sub-equal in length to postocular with interantennal elevation; vertex medially longitudinally sulcate, wider than an eye; ocelli elevated, narrowly separated, nearer to each other than to eyes. Basal segment of rostrum extending to anterior margin of eyes shorter than segment 2. Anterior lobe of pronotum shorter than posterior lobe and with oblique and arcuate sulci; posterior margin of posterior lobe thickened. Lateral margins of abdomen parallel. Anterior and median femora moderately incrassate; anterior and median tibiae with a fossula spongiosa.

Type species: *Cerilocus lydenburgi* Distant.

Lydenburgia lydenburgi (Distant)

(Text-fig. 16)

COLOUR. Antennae, head and rostrum black; interantennal elevation, juga and part of genae light red; basal segment of rostrum with a feeble reddish suffusion on outer surface. Pronotum light red; collar, except laterally, anterior lobe of pronotum anteriorly and posteriorly, posterior lobe with a wide transverse stripe anteriorly, pleura with a large spot, black. Apex of scutellum light red. Corium black with a large red spot apically; membrane dark infumate with a faint coppery lustre. Abdomen dorsally, a spot at apex of each connexival segment black; rest of connexivum, abdomen ventrally light red, the latter with transverse, intersegmental stripes and segment 2, except laterally, black. Tarsi piceous; anterior tibiae testaceous with brown suffusion on outer surface and apically; anterior femora light red, broadly apically and narrowly basally black; posterior femora and tibiae, coxae and trochanters black.

STRUCTURE. Antennae, head including rostrum, body and legs with abundant moderately long setae; tibiae with abundant short setae also on inner surface. Median sulcus on vertex deep and with lateral margins somewhat rugulose anteriorly; ocellar interspace about twice as wide as an ocellus. Sulci on anterior pronotal lobe shallow; sulcus on posterior lobe very narrow and within a narrow, shallow transversely striate depression; lobe laterally striate. Disc of scutellum deeply excavate with transverse and oblique carinae within excavation; apical spine rounded and somewhat elevated. Abdomen ventro-laterally transversely striate. Fossula spongiosa on tibiae about one-third as long as tibia.

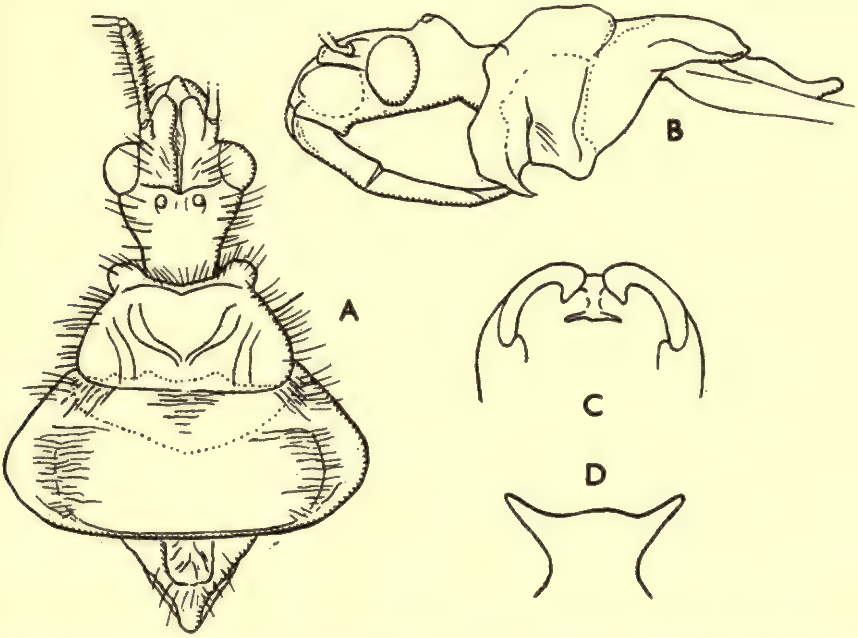

FIG. 16.—*Lydenburgia lydenburgi* (Distant), gen. n. A. Head, pronotum and scutellum (dorsal view); B. head, pronotum and scutellum (lateral view); C. pygophore (dorsal view); D. sub-apical process of pygophore.

Total length	16·00 mm.
Hemelytra	10·00 mm.
Greatest pronotal width	4·50 mm.

SPECIMEN EXAMINED. One ♂ (holotype), S. Africa, Transvaal, Lydenburg Dist. (Distant coll. B.M. 1911–383).

The affinity of *Lydenburgia* is uncertain. It would appear to belong to the *Plynus-Plynoides* group. The species *lydenburgi* was originally placed by Distant in *Acanthaspis* (Ann. S. Afr. Mus. III, **2**, 44–46) but was later transferred to *Cerilocus*.

It differs from *Cerilocus* in being densely setose and in having the vertex wider than an eye, the basal antennal segment extending well beyond the apex of the head and about half as long as segment 2, the interantennal elevation with the lateral margins parallel and the apex not bifurcate, small ocelli, the postocular sub-equal in length to the anteocular and gradually, not abruptly, narrowed to base, the posterior pronotal lobe with the posterior margin thickened, the abdomen with the lateral margins parallel and midventrally carinate, the anterior femora without spines and the metasternum not carinate.

Ukambocoris gen. n.

Size. Moderate. Basal segment of antennae sub-equal in length to anteocular, about one-third as long as segment 2. Anteocular longer than postocular with a bifurcate interantennal elevation. Vertex wider than an eye and with a Y-shaped median sulcus; upper area of genae carinate. Basal segment of rostrum not extending to anterior margin of eyes, shorter than segment 2. Pronotum wider than long; both lobes with a median longitudinal sulcus; disc of posterior lobe somewhat flattened; transverse sulcus somewhat obscurely carinulate. Disc of scutellum wider than long; apex produced, somewhat compressed laterally. Prosternum with a rounded elevation laterally; metasternum with a median longitudinal carina. Anterior and median femora moderately incrassate; anterior and median tibiae with a fossula spongiosa. Veins of corium prominent.

Type species: *Ukambocoris tiwae* sp. n.

Ukambocoris tiwae sp. n.

(Text-fig. 17)

Colour. Basal segment of antennae, head and thorax piceous; segment 2 of antennae, segment 2 of rostrum, light brown. Postocular with an obscure yellowish spot laterally. Corium fuscous with a large, sub-median dark yellow spot; membrane dark infumate. Abdomen brown; ventro-laterally with yellowish spots. Tarsi, tibiae dark brown; anterior and median femora reddish yellow with basal half and apex narrowly dark brown; posterior femora reddish yellow with basal three-fourths and apex narrowly, dark brown.

Structure. Apex of interantennal elevation very widely bifurcate; sulcus between it wide and deep. Ocellar interspace about one and a half times as wide as an ocellus. Vertex about twice as wide as an eye; median sulcus wide and deep. Median and lateral sulci on posterior pronotal lobe obscurely foveolate; sulcus on anterior lobe on posterior half of lobe; sulcus on posterior lobe on about three-fourths of lobe.

Total length	22·00 mm.
Hemelytra	15·00 mm.
Greatest pronotal width	6·00 mm.

SPECIMEN EXAMINED. One ♀ (holotype), Brit. E. Africa, Ukamba, Tiwa R., 22–27 Jan. 1912, S. W. J. Scholefield (B.M. 1912–401).

Very closely allied to *Neokhafra* gen. n. It differs mainly in the shape of the interantennal elevation, the sculpture of the vertex and of the pronotum on which the foveoles are very feeble and in having the venation of the corium prominent. In *Neokhafra* the interantennal elevation is not widely bifurcate and separate and the venation of the corium is indistinct.

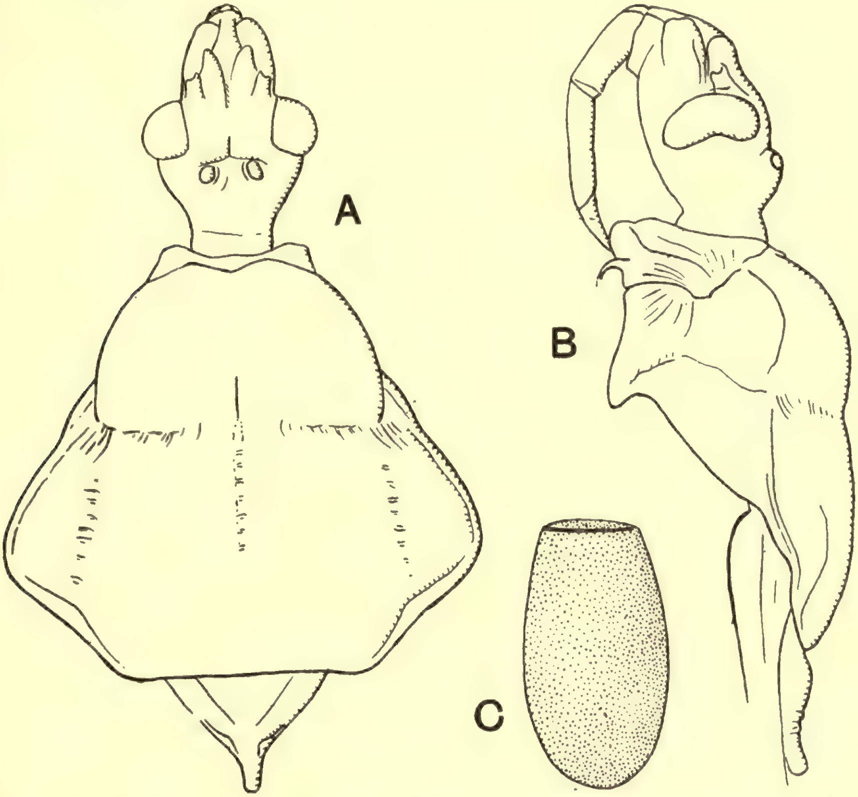

FIG. 17.—*Ukambocoris tiwae* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head, pronotum and scutellum (lateral view); C. ovum.

Sub-family PIRATINAE

Fusius rubricosus (Stål)

Fusius rubricosus Stål, 1855, *Öfv. Svenska Vet-Ak. Förh*: 38 (*Pirates*); 1862, *Stett. ent. Zeit.* **22**: 458; 1865, *Hem. Afr.* **3**: 115, (*Fusius*); 1874, *Enum. Hem.* **4**: 57, (*Pirates* sub-gen.)—Walker, 1873, *Cat. Hem. Brit. Mus.* **7**: 109, III (*Pirates*)—Jeannel, 1919, *Voy. All. Jeann. Afr. or. Hém.* **3**: 243.—Schouteden, 1931, *Ann. Mus. Congo belg. Zool.* (3), Sect. II, **1**: 145; 1944, *Explor. Parc. nat. Albert,* **45**: 21.—Villiers 1948, *Faune Empire franç. IX, Hém. Réduv*: 237.—Miller, 1953, *Trans. Zool. Soc. Lond.* **27**: 589.—*basicollis* Signoret, 1858, in *Thomson Arch. ent.* II: 310 (*Pirates*).

A preliminary examination of a series of specimens labelled *Fusius rubricosus* in the British Museum suggested that more than one species were involved. A more detailed study of the male genitalia confirmed that this was the case and, in addition to true *rubricosus* there were seven other species. These I describe here as new.

Although there is a close mutual resemblance in respect of the general habitus and colour pattern, the species can be separated into two distinct groups, namely, those in which the anterior pronotal lobe is unicolorous and those in which it is bicolorous. There is some variation in the colour of the hemelytral membrane in *rubricosus*.

The shape of the apical process of the pygophore is of great assistance in the separation of the species. In those species which I consider to be *rubricosus* there is some variation in the shape of this part, but not sufficient to justify splitting the species further.

The difference in shape of the apical process of the pygophore in *rubricosus* and in the other species is very marked.

A modification of the 6th ventral abdominal segment and an asymmetrical tubercle on the 5th ventral segment is to be seen in certain species. The former modification consists of the sub-apical margin of the segment being highly sclerotized and serrate. This may possibly form the strigil for stridulatory purposes.

Fusius rubricosus is stated in literature to be distributed over the whole of the Ethiopian Region. However, now that it is demonstrated here that there is more than one species in the genus, the true *rubricosus* would appear to be confined to eastern and southern Africa.

The following key and the figures of the apical process of the pygophore will facilitate the separation of the species of *Fusius*.

Key to species of *Fusius*

1. Anterior lobe of pronotum very obscurely punctate, unicolorous ; segmentation of the abdomen ventrally normal 2
–. Anterior lobe of pronotum distinctly punctate, not unicolorous ; segmentation of the abdomen ventrally with modifications 3
2. Legs, abdomen ventrally, except narrowly ventro-laterally black . . *distinctus* sp. n.
–. Legs, abdomen ventrally, except broadly ventro-laterally, piceous . . *sylvestris* sp. n.
3. Segment 6 of abdomen ventrally with part of the sub-apical margin strongly sclerotized, irregular ; segment 5 without an asymmetrical tubercle 4
–. Segment 6 of abdomen ventrally normal ; segment 5 asymetrically laterally tuberculate 6
4. Anterior lobe of pronotum anteriorly and punctate areas reddish 5
–. Anterior lobe of pronotum hardly at all reddish . . . . . . *hargreavesi* sp. n.
5. Anterior margin of collar strongly concave . . . . *rubricosus* Stål
–. Anterior margin of collar feebly concave . . . . *ugandensis* sp. n.
6. Anterior lobe of pronotum black, broadly light red anteriorly and with a deep, moderately wide median sulcus basally . . . . *gowdeyi* sp. n.
–. Anterior lobe of pronotum coppery green, obscurely reddish anteriorly and with a very narrow median sulcus basally 7
7. Posterior margin of anterior pronotal lobe distinctly angulate medially . *liberiensis* sp. n.
–. Posterior margin of anterior pronotal lobe almost straight . . . . *dilutus* sp. n.

Fusius rubricosus (Stål)

(Text-fig. 18)

SPECIMENS EXAMINED. One ♂ (holotype), Caffraria, 1 ♂, Caia, Zambesia, 22.xi.1910, H. Swale, (B.M. 1913-417); 1 ♂, Tanganyika, W. shore Lake Manyara, Feb.–May 1935, B. Cooper (B.M. 1935–418); 1 ♂, N. Rhodesia, Congo Border, Kiposki, 26.i.1928, H. Silvester Evans (B.M. 1932–154); 2 ♂, S. Africa, Barberton, P. Rendall (B.M., Distant coll. 1911–383); 1 ♀, S. Africa, Pondoland, Port St. John, R. E. Turner, (B.M. 1923–307); 1 ♀, S. Rhodesia, Odzi dist. 2.ii.1948, N. C. E. Miller.

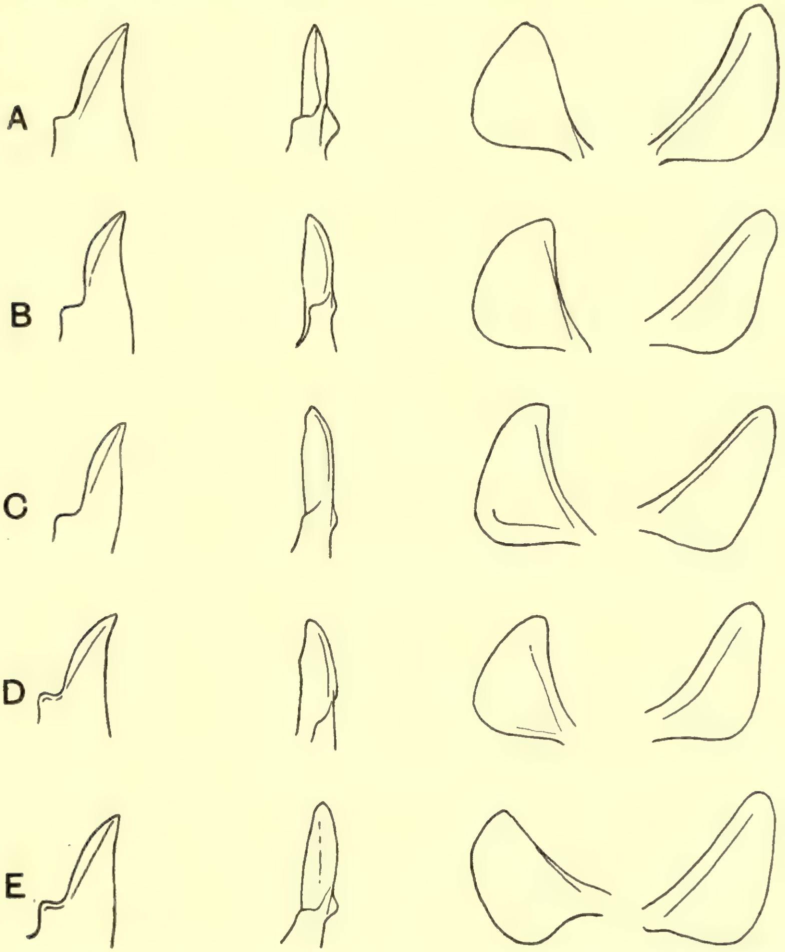

FIG. 18.—*Fusius rubricosus* (Stål). Apical process of pygophore (terminal and lateral views), and harpagones; A. holotype; Caffraria; B. Barberton, Cape, S. Africa; C. N. Rhodesia; D. Zambesia; E. Tanganyika.

Fusius distinctus sp. n.

(Text-fig. 19 F)

SPECIMENS EXAMINED. One ♂ (holotype), E. Belgian Congo (no precise locality), 1.x.1946, T. H. E. Jackson (B.M. 1946–354); 1 ♂, 1 ♀ (paratypes), French Cameroons, D'Ja Posten, lat. 3.15 N., long. 13.30 E., 15.4–1.4.xi.1936, F. G. Merfield (B.M. 1936–654).)

Fusius hargreavesi sp. n.

(Text-fig. 19 C)

SPECIMENS EXAMINED. One ♂ (holotype), Sierra Leone, Njala, 1.viii.1926, E. Hargreaves (B.M. 1948–548).

Fusius ugandensis sp. n.

(Text-fig. 19 D)

SPECIMEN EXAMINED. One ♂ (holotype), Uganda, Kampala, 1–10.i.1938. C. C. Gowdey (B.M. 1918–65).

Fusius gowdeyi sp. n.

(Text-fig. 19 H)

SPECIMENS EXAMINED. One ♂ (holotype), Uganda, Luzinga, 17.v.1916, C. C. Gowdey (B.M. 1916–209); one ♀ (paratype), S. of Lake George, 3,300–3,400 ft., 17–19 Oct. 1911, S. A. Neave (B.M. 1912– 193).

Fusius liberiensis sp. n.

(Text-fig. 19 G)

SPECIMEN EXAMINED. One ♂, (holotype), Liberia, Sinoe, 1905, P. H. Neuman, (B.M. 1905–159).

Fusius dilutus sp. n.

(Text-fig. 19 A & B)

SPECIMENS EXAMINED. One ♂ (holotype), 2 ♂ (paratypes), Calabar (B.M. Distant coll. 1911–383); 1 ♂ (paratype), Cameroons, Escalera (B.M. 1903–355); 1 ♂ (paratype), Gabon, Libreville, 1936, coll. J. Primot.

Fusius sylvestris sp. n.

(Text-fig. 19 E)

SPECIMEN EXAMINED. One ♂ (holotype), Uganda, Mpanga Forest Toro, 800 ft. 13–23 Nov. 1911, S. A. Neave (B.M. 1912–193).

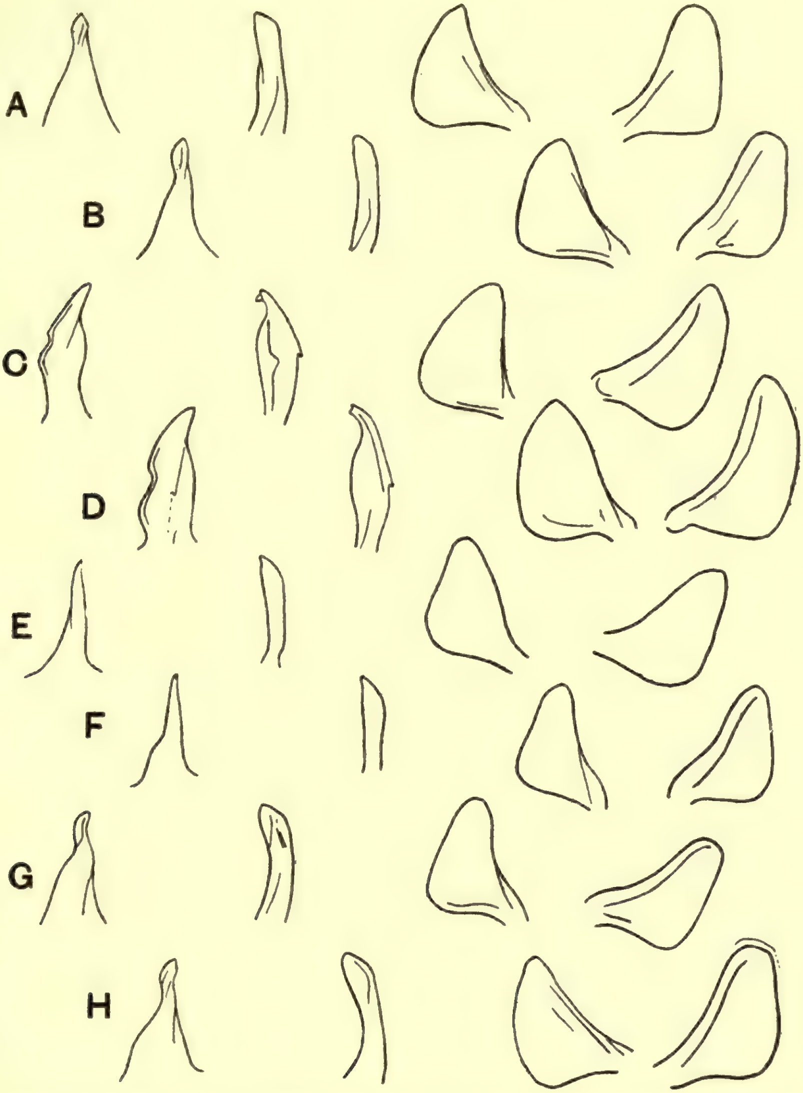

FIG. 19.—Apical process of pygophore (terminal and lateral views) and harpagones. A. *Fusius dilutus* sp. n. (Gaboon) ; B. *Fusius dilutus* sp. n. (Calabar) ; C. *Fusius hargreavesi* sp. n.; D. *F. ugandensis* sp. n. ; E. *F. sylvestris* sp. n.; F. *F. distinctus* sp. n. ; G. *F. liberiensis* sp. n.; H. *F. gowdeyi* sp. n.

Sub-family ECTRICHODIINAE

Nebriscoides gen. n.

SIZE Small. Antennae with 6 segments; segment 1 longer than anteocular. Antennophores nearer to eyes than to apex of head. Eyes hardly at all prominent, shorter than height of head; transverse sulcus on vertex situated behind eyes; ocelli somewhat elevated, moderately narrowly separated. Head a little shorter than pronotum; postocular globose with a distinct neck. Basal segment of rostrum shorter than anteocular and segment 2. Anterior lobe of pronotum transverse, shorter than posterior lobe, both lobes medially longitudinally sulcate; transverse sulcus obscurely carinulate; lateral sulci on posterior lobe transversely foveolate. Scutellum transverse with 3 apical spines; disc excavate. Mesosternum with 3 longitudinal transversely sulcate depressions. Hemelytra extending almost to apex of abdomen; base of external cell of membrane narrower basally than internal cell; veins of corium distinct. Abdomen ventrally intersegmentally with transverse carinulae; segments 2–6 midventrally longitudinally sulcate; external apical angle of connexival segment 2 produced. Legs moderately slender; femora unarmed; anterior and median tibiae with a fossula spongiosa.

Type species: *Nebriscoides nitens* sp. n.

Nebriscoides nitens sp. n.

(Text-fig. 20)

COLOUR. Segments 1–3 of antennae piceous; remaining segments pale stramineous. Head, anterior lobe of pronotum, abdomen, propleura, except epimeron, legs, except tarsi, light red; posterior lobe of pronotum, propleural epimeron, scutellum, meso- and metapleura, sterna, piceous. Corium and membrane fuscous; apical half of corium light red. Tarsi testaceous.

STRUCTURE. Antennae moderately abundantly setose. Head and pronotum glabrous; vertex very obscurely transversely striate. Ocellar interspace half as wide as space between an ocellus and an eye. Apical margin of scutellum straight; median spine very short, conical. Sulcus on 6th abdominal segment deep with the sides thickened. Fossula spongiosa on tibiae extremely short. Base of external cell of membrane about half as wide as base of internal cell.

Total length	7·50 mm.
Hemelytra	5·00 mm.
Greatest pronotal width	2·20 mm.

SPECIMEN EXAMINED. One ♂ (holotype), Australia, N. Queensland, Binna Burra, Lamington Plateau, 23.ii.1942, J. W. Littler.

This new genus has more or less the habitus of *Ectrychotes* Burmeister (*pro-parte*), 1835, Handb. II, 237.

It differs from it chiefly in having the basal rostral segment shorter than the anteocular, the postocular distinctly globose, the vertex obscurely striate, the median sulcus on the pronotum hardly at all foveolate, the scutellum transverse with the lateral spines widely separated, the abdomen midventrally sulcate, the femora without a projection on the lower surface and the fossula spongiosa very short.

In the shape of the head, the feebly prominent eyes and ocelli, relative length of the basal antennal segment and head and shape of the pronotum it agrees with *Nebriscus* Bergroth, 1895, *Proc. Roy. Soc. Victoria*, vii, 300.

It differs from *Nebriscus*, among other things, by having 3 scutellar spines, the base of the external cell of the membrane shorter, not equal in width to base of the internal cell and in having the fossula spongiosa very short.

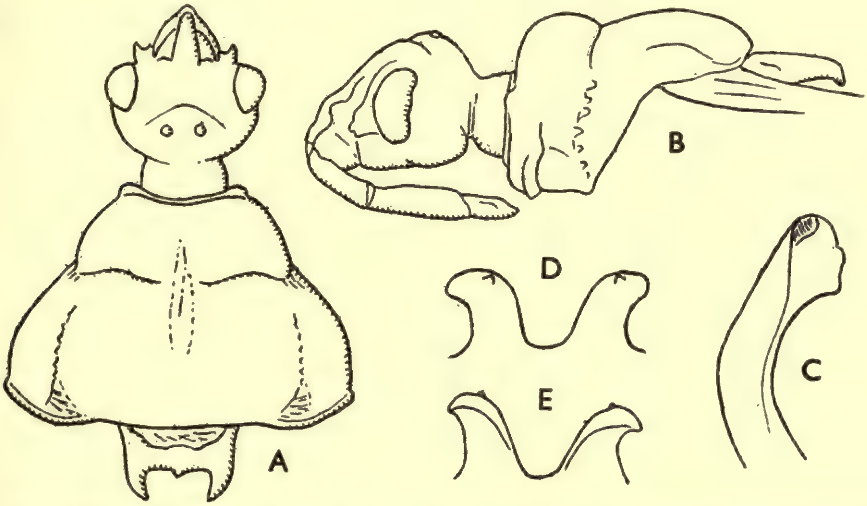

Fig. 20.—*Nebriscoides nitens* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head, pronotum and scutellum (lateral view); C. harpago; D. apical process of pygophore (posterior view); E. apical process of pygophore (anterior view).

Caloundranius gen. n.

Size. Small. Antennae setose, damaged. Basal segment sub-equal in length to head; segment 2 longer than basal segment. Head shorter than pronotum; vertex wider than an eye; ocelli large elevated, narrowly separated; postocular globose, transverse with a distinct neck; eyes prominent, shorter than height of head; gula laterally basally with setigerous tubercles. Basal segment of rostrum longer than anteocular, shorter than segment 2. Pronotum wider than long; both lobes transverse, medially longitudinally sulcate, the sulci concurrent; transverse sulcus carinulate; posterior lobe very deeply depressed at humeral angles. Scutellum transverse with 2 widely separated apical spines and with the disc excavate. Hemelytra extending to apex of abdomen; base of external cell of membrane very narrow. Abdomen ventrally intersegmentally longitudinally sulcate. Mesosternum with three longitudinal transversely carinulate depressions. Anterior and median femora moderately incrassate; anterior and median tibiae with a fossula spongiosa.

Type species: *Caloundranius formosus* sp. n.

Caloundranius formosus sp. n.

(Text-fig. 21)

Colour. Antennae, head, meso- and metapleura, sterna, legs, except tarsi, piceous. Pronotum, scutellum, propleura, prosternum, abdomen, light red. Segments 5 and 6 of abdomen ventro-laterally, segment 7 almost entirely, segment 9 piceous; connexivum of segments 6 and 7 dorsally with a piceous spot. Corium and membrane fuscous, the former with apex red.

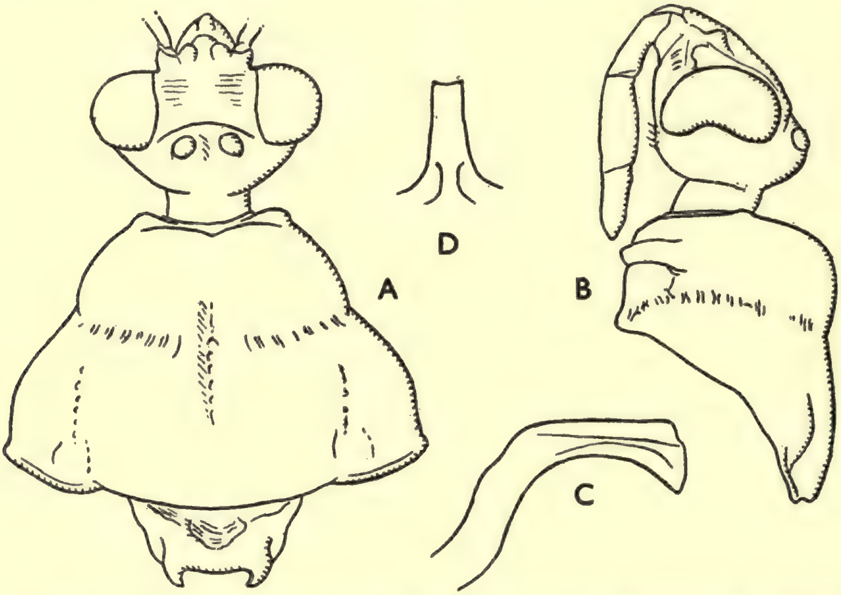

Fig. 21.—*Caloundranius formosus* gen. n., sp. n. A. Head, pronotum and scutellum, (dorsal view); B. head and pronotum (lateral view); C. harpago; D. apical process of pygophore.

Structure. Vertex about twice as wide as an eye, glabrous with obscure, transverse striae anteriorly. Ocellar interspace a little wider than an ocellus and sub-equal in width to space between an ocellus and an eye; tubercles on gula very short, rounded. Anterior lobe of pronotum deeply transversely sulcate behind collar; posterior lobe obscurely transversely striate laterally. Scutellar spines very short, curved inwards, acute. Veins of corium prominent; base of external cell of membrane about one-fourth as wide as base of internal cell. Fossula spongiosa on tibiae a little longer than basal tarsal segment.

Total length	9·00 mm.
Hemelytra	5·50 mm.
Greatest pronotal width	2·50 mm.

SPECIMENS EXAMINED. One ♂ (holotype), Australia, S.E. Queensland, Caloundra, 29.viii.1932 (no collector's name), 1 ♂ (paratype), Gayndah (Distant coll. B.M. 1911–383).

Allied to *Antiopuloides* Miller 1952, *Ann. Mag. nat. Hist.* (12), 5, 547, from which it differs in having the basal antennal segment as long as, and not much shorter than the head, the eyes large, prominent and a little shorter than height of head, the vertex more or less flat, the transverse sulcus strongly arcuate and not extending to eyes, the ocelli large, elevated, both lobes of the pronotum deeply medially sulcate, the connexival segments without sulci, the abdomen midventrally longitudinally sulcate and the anterior and median femora and tibiae less incrassate, the latter with a very short fossula spongiosa which, in *Antiopuloides* is as long as segments 1 and 2 of tarsi together. The scutellum and membranal cells are similar in both genera.

Brisbanocoris gen. n.

SIZE. Small. Antennae with 6 segments, setose; basal segment longer than head; segment 2 longer than basal segment. Head and body glabrous. Anteocular shorter than postocular. Eyes prominent, shorter than height of head; postocular transverse, abruptly narrowed to neck; vertex wider than an eye; ocelli large, elevated, narrowly separated. Basal segment longer than segment 2. Pronotum wider than long; anterior lobe shorter than posterior lobe; both lobes medially longitudinally sulcate, the sulcus on anterior lobe not extending to transverse sulcus; posterior lobe medially and laterally depressed. Scutellum with 2 narrowly separated spines. Hemelytra extending almost to apex of abdomen; base of external cell of membrane shorter than base of internal cell; vein 1A in membrane branching before coalescing with Cu, thus forming a vein 1A-Cu. Abdomen with external apical angle of segment 2 of connexivum produced; inter-segmentally ventrally without carinulae. Anterior and median femora moderately incrassate; anterior and median tibiae with a fossula spongiosa.

Type species: *Brisbanocoris fuscipennis* sp. n.

Brisbanocoris fuscipennis sp. n.

(Text-fig. 22)

COLOUR. Segments 1–4 and 6 of antennae, head, thorax and legs, except tarsi, piceous; segment 5 of antennae pale stramineous, suffused with piceous basally. Corium fuscous; membrane blackish infumate. Abdomen light red; pygophore, segment 7 medially and other segments intersegmentally piceous. Tarsi brown.

STRUCTURE. Vertex smooth, about twice as wide as an eye; ocellar interspace equal in width to an ocellus. Posterior lobe of pronotum twice as wide as anterior lobe. Disc of scutellum deeply excavate. Produced external apical angle of segment 2 of connexivum rounded. Fossula spongiosa on tibiae one-fourth the length of tibia.

Total length	11·00 mm.
Hemelytra	7·80 mm.
Greatest pronotal width	3·60 mm.

Specimen examined. One ♂ (holotype), Australia, Brisbane, F. Kieseker. The affinity of this new genus is doubtful, but possibly it should be placed near *Santosia* Stål, 1858, *Öfv. Svenska Vet-Ak. Förh.* : 442.

Sub-family Harpactorinae

Magneticocoris gen. n.

Size. Moderately large. Elongate. Basal segment of antennae as long as head, pronotum and scutellum together ; segment 2 one-third as long as 1 ; segments 3 and 4 together longer than 1. Head sub-equal in length to pronotum ; antennophores nearer to apex of head than to eyes and with an elevation basally ; vertex wider than an eye ; ocelli prominent, widely separated ; postocular longer than anteocular, gradually narrowed to base and constricted sub-basally. Rostrum moderately thick ; basal segment longer than anteocular and sub-equal in length to segment 2. Pronotum wider than long ; lateral angles of collar produced ; anterior lobe with a median longitudinal sulcus ; posterior lobe with a median, trapezoidal depression with a feeble carina laterally. Scutellum as wide as long ; disc depressed ; apex declivous. Hemelytra extending beyond apex of abdomen ; external cell of membrane narrower at base than internal cell. Connexival segments 5–7 ampliated. Legs slender ; femora constricted apically.

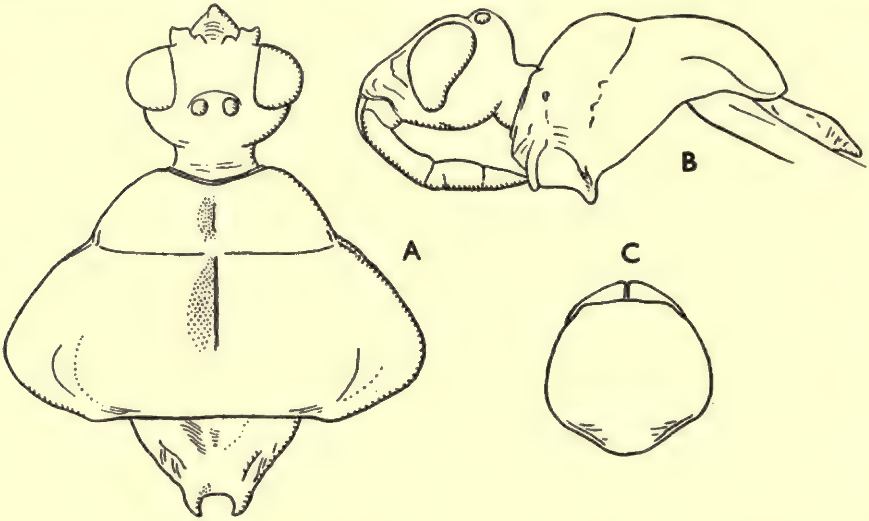

Fig. 22.—*Brisbanocoris fuscipennis* gen. n., sp. n. a. Head, pronotum and scutellum, (dorsal view) ; b. head, pronotum and scutellum (lateral view) ; c. pygophore (terminal view).

Type species : *Magneticocoris funebris* sp. n.

Magneticocoris funebris sp. n.

(Text-fig. 23)

COLOUR. Segments 1 and 2 of antennae black; segments 3 and 4 reddish yellow. Head, body and legs black; postocular with an elongate, narrow yellow spot between ocelli. Connexivum light red with a suffused piceous spot at base of segments. Propleural epimeron, acetabula piceous. Corium fuscous; membrane infumate with a metallic green lustre.

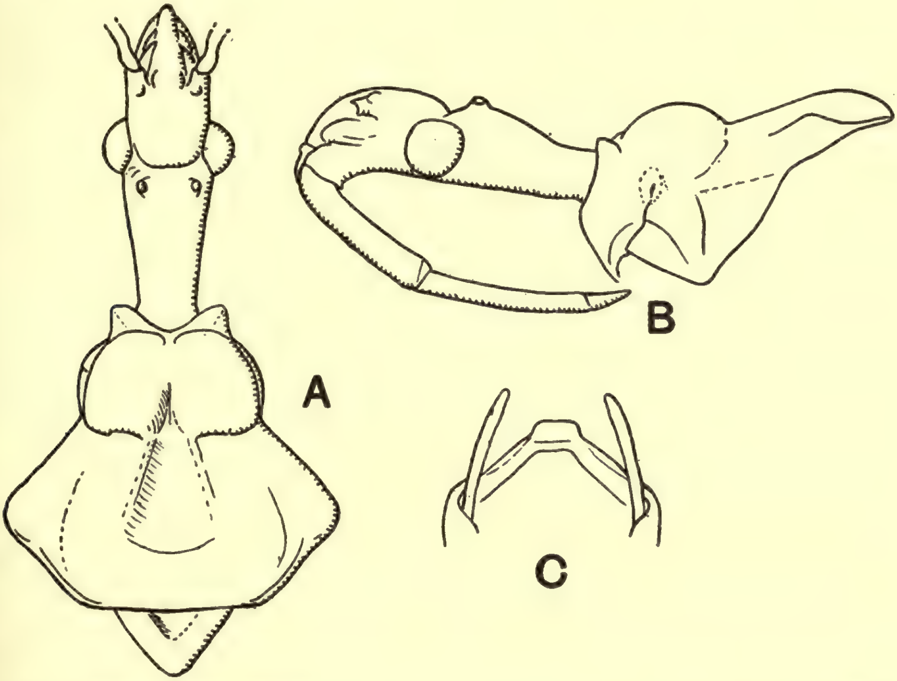

FIG. 23.—*Magneticocoris funebris* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head and pronotum (lateral view); C. pygophore (dorsal view).

STRUCTURE. Head and pronotum glabrous. Ocelli small; interspace equal in width to space between an ocellus and an eye; elevations at base of antennophores very low, rounded. Discal cell of corium longer than wide; hemelytra extending very little beyond apex of abdomen.

Total length	19·00 mm.
Hemelytra	12·00 mm.
Greatest pronotal width	4·50 mm.

SPECIMENS EXAMINED. One ♂ (holotype), 1 ♂ (paratype), Australia, N. Queensland, Magnetic Island, 2.iv.1934 (no collector's name).

Closely allied to *Poecilobdallus* Stål 1868, *Hem. Fabr.* **1** : 111, from which it differs in having a relatively narrower vertex, larger eyes, relatively longer basal antennal segment, more elevated but less widely separated ocelli, the base of the vertex (in profile) rounded, not angulate, the posterior pronotal lobe strongly depressed medially and the base of the external cell of the membrane one-third, not half as wide as base of the internal cell.

Gminatellus gen. n.

SIZE. Small. Glabrous. Basal segment of antennae sub-equal to head and pronotum together. Head a little longer than pronotum ; antennophores with an elevation basally ; eyes prominent ; vertex wider than an eye ; ocelli small, moderately elevated. Basal segment of rostrum longer than anteocular, sub-equal in length to remaining segments together. Pronotum wider than long (excluding humeral spines) ; lateral angles of collar produced ; anterior lobe medially longitudinally sulcate for the greater part of its length, the sulcus not reaching the transverse sulcus ; subdorsally, sub-basally with 2 spines ; posterior lobe medially depressed anteriorly and with a carina on each side of depression ; humeral angles and disc with spines ; posterior and postero-lateral margins dorso-ventrally compressed. Scutellum triangular, wider than long with disc depressed and declivous apically ; apex with a spine. Hemelytra extending beyond apex of abdomen ; discal cell of corium longer than wide ; external cell of membrane narrower basally than internal cell. Abdomen laterally ampliated. Legs slender ; femora somewhat constricted apically.

Type species : *Gminatellus debilis* sp. n.

Gminatellus debilis sp. n.

(Text-fig. 24)

COLOUR. Testaceous with faint reddish suffusion. Hemelytra hyaline, very pale.

STRUCTURE. Elevations on antennophores sub-conical. Ocellar interspace a little wider than space between an ocellus and an eye. Vertex a little less than twice as wide as an eye. Scutellar spine rounded apically, horizontal. Base of external cell of membrane a little more than half as wide as base of internal cell.

Total length	9·00 mm.
Hemelytra	7·00 mm.
Greatest pronotal width (excluding spines). . .	2·50 mm.

SPECIMEN EXAMINED. One ♂ (holotype), Australia, Queensland, (no precise locality), F. P. Dodd (B.M. 1904–284).

Allied to *Gminatus* Stål 1859, *Öfv. Svenska Vet-Ak. Förh.* : 364, from which it differs in having relatively longer eyes, the median sulcus on the anterior pronotal lobe narrow and not concurrent with depression on posterior lobe, slender pronotal spines and very slender legs, the scutellar spine horizontal and not somewhat recurved, the apex of the scutellar disc more strongly declivous and the apical segment of the anterior tarsi sub-equal to, and not longer than segments 2 and 3 together.

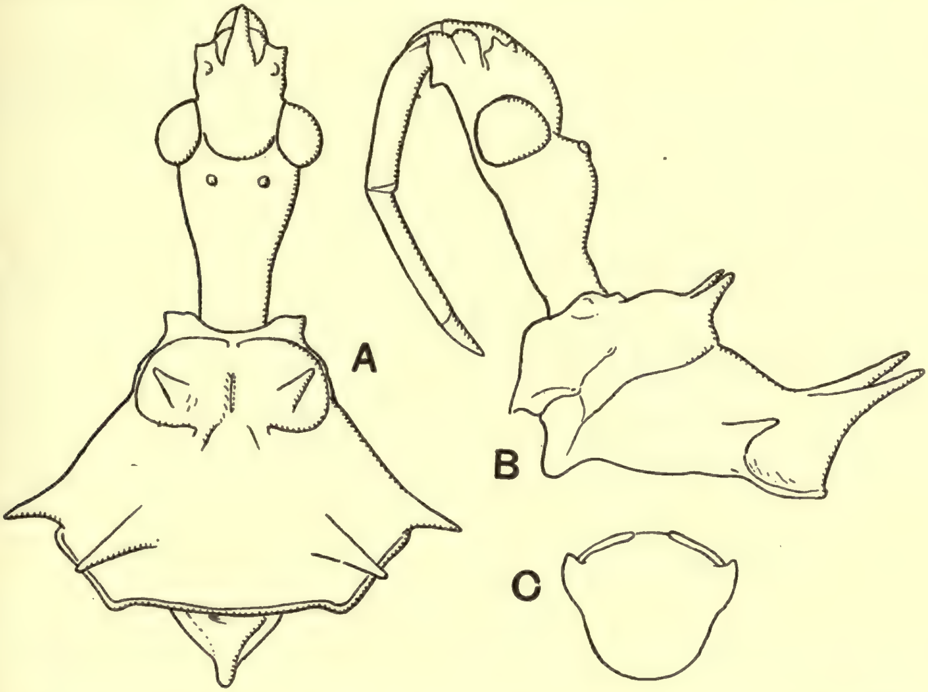

FIG. 24.—*Gminatellus debilis* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head and pronotum, (lateral view); C. pygophore (terminal view).

Dorrigocoris gen. n.

SIZE. Small. Basal segment of antennae a little shorter than head and pronotum together; segment 2 about one-third as long as 1. Head sub-equal in length to pronotum; antennophores situated about equidistant between eyes and apex of head and with a spine basally; eyes moderately prominent, shorter than height of head; vertex wider than an eye and with an obscure elevation basally laterally; ocelli elevated, widely separated; anteocular sub-equal in length to postocular; base of tylus elevated; basal segment of rostrum sub-equal in length to segment 2. Pronotum a little wider than long; lateral angles of collar prominent; anterior lobe medially sulcate and with a sub-dorsal sub-basal spine and 2 tubercles anteriorly; median sulcus concurrent with depression on posterior lobe; humeral angles produced and tubercles present sub-basally. Scutellum longer than wide, with an apical spine; disc depressed and declivous apically. Hemelytra extending beyond apex of abdomen; base of external cell of membrane narrower than base of internal cell; discal cell longer than wide. Anterior and median femora moderately incrassate; apex of all femora somewhat constricted.

Type species: *Dorrigocoris nigrispinis* sp. n.

Dorrigocoris nigrispinis sp. n.

(Text-fig. 25)

Colour. Segments 1 and 2 of antennae black; remaining segments ferruginous. Head and thorax yellow. Postocular dorsally black, except behind eyes and basally and with a narrow, longitudinal whitish stripe between ocelli. Spines and tubercles on pronotum black. Scutellum black; apical spine white. Apical half of clavus, membrane faintly infumate. Tibiae, tarsi and posterior femora black; coxae, trochanters, anterior and median femora yellow; apex of femora broadly black. Abdomen dorsally reddish suffused with black; connexivum reddish; abdomen ventrally apparently whitish; pygophore yellow.

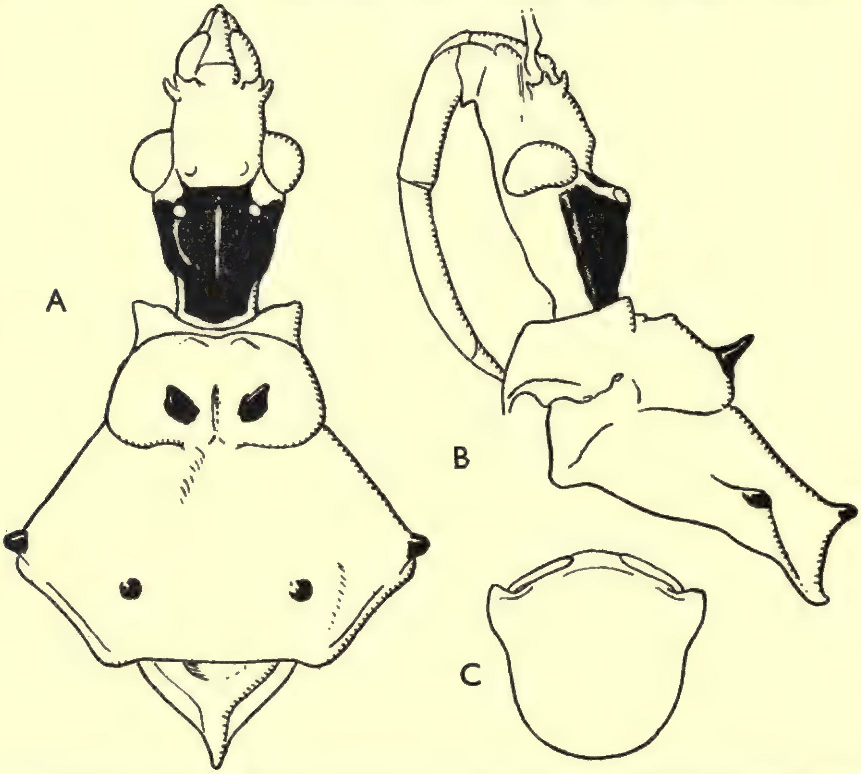

Fig. 25.—*Dorrigocoris nigrispinis* gen. n., sp. n. a. Head, pronotum and scutellum (dorsal view); b. head and pronotum, (lateral view); c. pygophore (terminal view).

Structure. Elevation at base of tylus transverse, rounded. Spines on antennophores short, curved, sub-acute; vertex about twice as wide as an eye; elevations on vertex basally rounded; ocellar interspace somewhat wider than space between an ocellus and an eye. Spines on anterior pronotal lobe sub-erect, acute; tubercles low, rounded; tubercles on posterior lobe short, sub-conical. Scutellar spine sub-acute, horizontal. Discal cell of corium twice as long as wide; internal cell of membrane nearly three times as wide basally as external cell.

	♂	♀
Total length	11·50 mm.	12·50 mm.
Hemelytra	7·60 mm.	9·00 mm.
Greatest pronotal width (including tubercules).	3·00 mm.	3.50 mm.

Specimens examined. One ♂ (holotype), Australia, N.S.W., Ulong East, Dorrigo, W. Heron; 2 ♀ (paratypes), N. Queensland, Tam Mts., Kelsall coll. (B.M. 1910–168).

Allied to *Gminatus* Stål (*loc. cit.*). Differs in having the postocular more globose and sub-equal in length to, not longer than anteocular, the basal rostral segment extending to anterior, not to posterior margin of eyes, tubercles on the anterior pronotal lobe in front of sub-dorsal spines, very short, rounded tubercles on posterior lobe, the scutellar spine very small, acute, not thick and rounded apically and segments 5 and 6 of connexivum not somewhat ampliated and wider than remaining segments.

Dorrigocoris acutispinis sp. n.

(Text-fig. 26)

Colour. Segments 1 and 2 of antennae black; remaining segments ferruginous. Head and body dark yellow; postocular dorsally black except basally and behind eyes and with a narrow, longitudinal yellow stripe between ocelli. Coxae and trochanters yellow; femora and tibiae black, the anterior pair of the former suffused with yellow basally. Apical half of clavus, membrane, hyaline, faintly infumate with metallic green lustre.

Structure. Elevation at base of tylus transverse, rounded. Spines on antennophores feebly curved, short, acute. Vertex twice as wide as an eye. Spines on anterior pronotal lobe erect, slender, acute; tubercles subconical; tubercles on posterior lobe sub-cylindrical, rounded apically. Scutellar spine short, acute, feebly elevated. Discal cell of corium about one-third longer than wide; internal cell of membrane about twice as wide basally as external cell.

	♂	♀
Total length	11·00 mm.	13·00 mm.
Hemelytra	8·00 mm.	7·80 mm.
Greatest pronotal width (including tubercles).	3·10 mm.	3·40 mm.

Specimens examined. One ♂ (holotype), Australia, Kuring-gai, 22.xi.1948, E. B. Britton, D. Lee (on flowers), (B.M. 1950–18) 1 ♂, (paratype), N.S.W. Sydney, Nov. 1902, J. F. Illingworth (B.M. 1924–449), 1 ♀ (paratype), Queensland, National Park, Dec. 1919, H. Hacker (B.M. 1924–455), 1 ♀ (paratype), N.S.W. 19 miles W. Woodenbong, nr. Kilarney, 8.xii.1948, E. B. Britton, P. B. Carne (B.M. 1950–18).

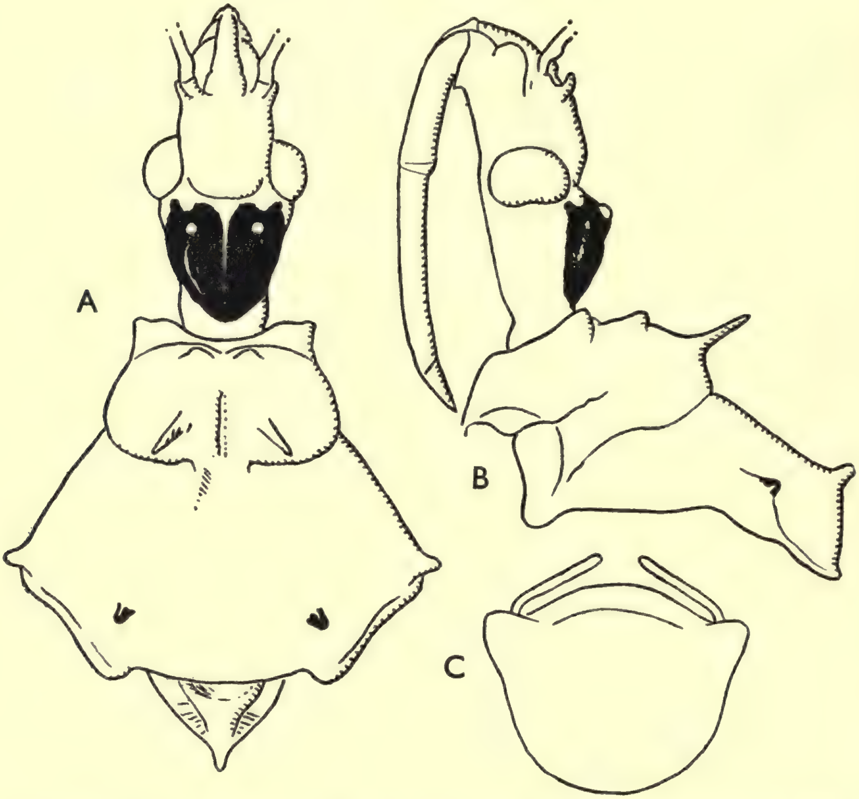

FIG. 26.—*Dorrigocoris acutispinis* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head and pronotum (lateral view); C. pygophore (terminal view).

***Austrarcesius* gen. n.**

SIZE. Large. Basal segment of antennae equal in length to head. Basal segment of rostrum longer than anteocular; segment 2 longer than basal segment. Head longer than pronotum; anteocular shorter than postocular; ocelli moderately elevated. Anterior pronotal lobe strongly convex, medially sulcate, shorter than posterior lobe; lateral angles of collar produced; posterior lobe medially sulcate with a carina on each side of sulcus and with sub-dorsal elevations posteriorly; humeral angles transversely carinate. Scutellum as wide as long with an apical spine; disc depressed. Hemelytra extending beyond apex of abdomen; internal cell of membrane wider at base than external cell. Segments 5–7 of connexivum lobately produced. Legs moderately slender.

Type species : *Austrarcesius bicolor* sp. n.

Austrarcesius bicolor sp. n.

(Text-fig. 27)

COLOUR. Segments 1 and 2 of antennae black ; segment 1 with a sub-apical reddish annulation ; remaining segments yellowish. Head shining black with base broadly reddish. Basal segment of rostrum black ; remaining segments piceous. Pronotum and propleura shining black ; lateral angles of collar and propleura anteriorly suffused with red ; meso- and metapleura, sterna reddish ; mesopleura suffused with piceous. Abdomen shining black ; connexival segments 4 and 7 mostly light reddish. Coxae reddish ; trochanters, femora and tibiae black ; anterior and median femora with a sub-median reddish annulation ; tarsi light brown.

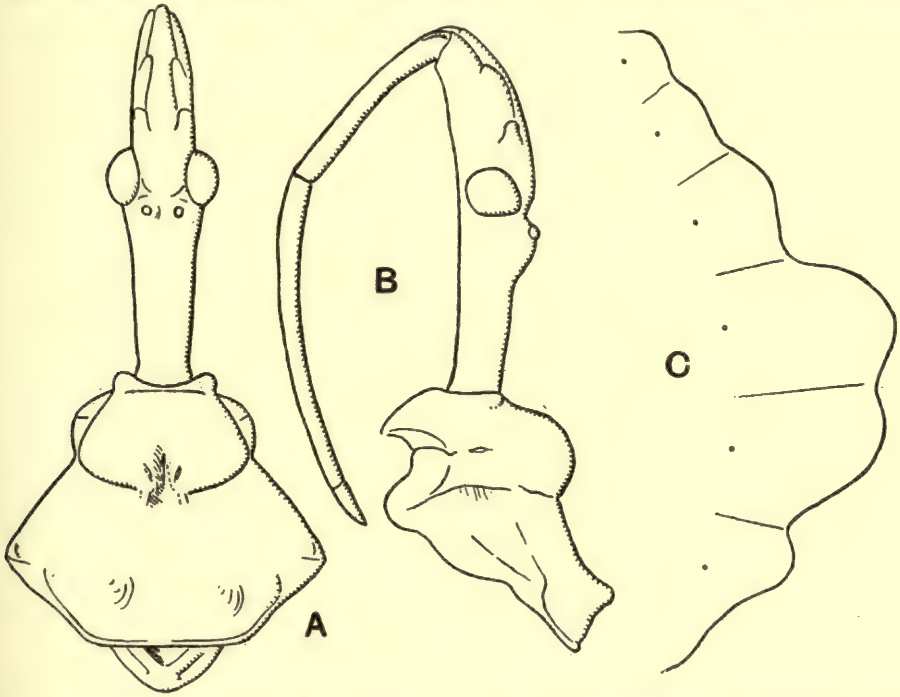

FIG. 27.—*Austrarcesius bicolor* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view) ; B. head and pronotum (lateral view) ; C. connexivum.

STRUCTURE. Propleura anteriorly, collar, posterior pronotal lobe and abdomen ventro-laterally with patches of white wax-like tomentose substance. Ocellar interspace wider than space between an ocellus and an eye. Vertex about one-third wider than an eye. Median sulcus on anterior pronotal lobe very deep ; lobe on each side of sulcus with a narrow, elongate depression ; sulcus concurrent with sulcus on posterior lobe ; head and thorax with abundant, fine, erect setae ; these are particularly abundant on scutellum.

Total length	23·00 mm.
Hemelytra	15·50 mm.
Greatest pronotal width	6·00 mm.

SPECIMEN EXAMINED. One ♀ (holotype), Australia, N. Queensland, Cairns, 28.xii.1923 (no collector's name).

Allied to *Arcesius* Stål, 1863, *Ann. Soc. ent. Fr.* : 35 from which it differs in having the pronotum much wider than long, the sulcus on anterior lobe deeper, the carinae on posterior lobe shorter and less defined, the scutellum triangularly depressed and not smooth and some connexival segments lobately produced.

Parischnolestes gen. n.

SIZE. Moderate. Elongate. Slender. Antennae missing. Head a little longer than pronotum ; anteocular shorter than postocular ; tylus vertical ; antennophores situated at apex of head and with a basal spine ; vertex wider than an eye ; ocelli elevated, widely separated. Basal segment of rostrum longer than segments 2 and 3 together. Pronotum longer than wide (excluding humeral spines) ; anterior lobe with a median foveole, a narrow median longitudinal sulcus basally and a spine on each side of mid-dorsum basally ; posterior lobe with sub-dorsal and humeral spines. Scutellum triangular, as wide as long ; disc depressed ; postscutellum with an apical spine. Hemelytra not extending to apex of abdomen ; corium very narrow, somewhat expanded apically ; discal cell absent ; external cell of membrane narrower basally than internal cell. Apex of 7th abdominal segment produced ; segment somewhat expanded laterally ; connexivum narrow ; spiracles somewhat elevated, situated on middle of connexival segments.

Type species ; *Parischnolestes maculipes* sp. n.

Parischnolestes maculipes sp. n.

(Text-fig. 28)

COLOUR. Brown. Ocellar elevation red. Base of clavus, corium (except area between claval suture and Cu, apex of clavus, hyaline), reddish ; membrane hyaline, whitish with infumate suffusion. Anterior and median femora reddish with irregular, longitudinal black stripes and spots ; tibiae, posterior femora brown. Setae pale fulvous.

STRUCTURE. Spine at base of antennophores short, acute ; vertex twice as wide as an eye. Ocellar interspace twice as wide as space between an ocellus and an eye. Spines on anterior pronotal lobe slender, sub-erect, a little longer than spines on posterior lobe. Spine on postscutellum short, conical.

Total length	13·50 mm.
Hemelytra	7·50 mm.
Greatest pronotal width (excluding spines)	1·70 mm.

SPECIMEN EXAMINED. One ♂ (holotype), Australia, S. Central Queensland, Roma, 20.ii.1951, E. F. Henzall.

Allied to *Ischnolestes* Stål, 1866, *Öfv. Svenska Vet-Ak. Förh.*: 268, with which it agrees, in habitus, presence of spines on antennophores and on both pronotal lobes, in having a short spine on the postscutellum and the 7th abdominal segment produced.

It differs in having the basal rostral segment longer than, not subequal in length to the remaining segments together, long spines on the anterior pronotal lobe, no spine on the lateral angles of the collar, the posterior pronotal lobe longer than the anterior lobe, the disc of the scutellum without a depression and relatively shorter hemelytra, the external cell of the membrane of which being one half, not two-thirds as wide at base as the internal cell.

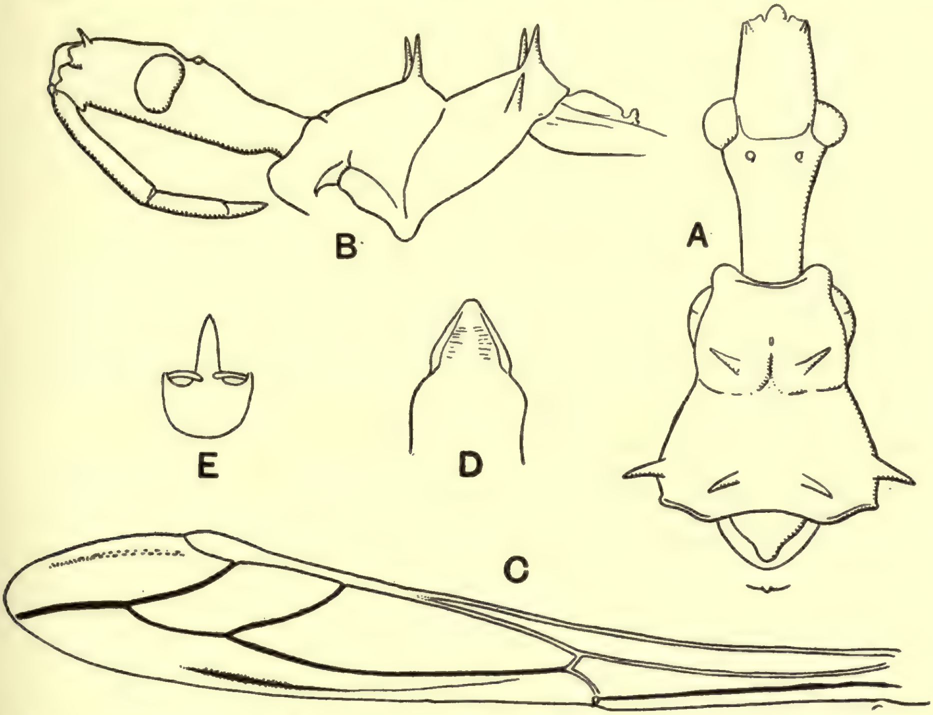

FIG. 28.—*Parischnolestes maculipes* gen. n., sp. n. A. Head, pronotum and scutellum (dorsal view); B. head, pronotum and scutellum (lateral view); C. hemelytron; D. apex of abdomen, ♂ (dorsal view); E. pygophore (terminal view).

Oedemanota gen. n.*

SIZE. Moderate. Basal segment of antennae longer than head; segments 2 and 3 together half as long as basal segment; segment 4 sub-equal in length to basal segment. Head narrow, a little shorter than pronotum; antennophores nearer to

* οἴδημα = swelling; νῶτος = back.

eyes than to apex of head ; vertex equal in width to an eye ; ocelli small, elevated, widely separated, nearer to eyes than to each other ; postocular longer than anteocular, narrowed from half its length to base ; rostrum slender ; basal segment extending to middle of eyes, shorter than segment 2. Anterior lobe of pronotum shorter than posterior lobe, medially longitudinally sulcate basally ; lateral angles of collar rounded ; posterior lobe with 3 globose elevations. Scutellum triangular with the apex declivous. Abdomen with connexival segments expanded and rounded ; segments 4–7 with the external margin deflected, thus forming a sac. Hemelytra extending beyond apex of abdomen ; discal cell of corium longer than wide ; base of external cell of membrane narrower than base of internal cell. Mesosternum depressed with margins of depression elevated. Anterior tibiae laterally compressed and with dense setae on internal and external margins ; anterior and median femora moderately incrassate, somewhat constricted apically. Glandular setae present on head, body and legs.

Type species : *Oedemanota kenyensis* sp. n.

Oedemanota kenyensis sp. n.

(Text-fig. 29)

Colour. Segments 1–3 of antennae piceous ; segment 4 brown. Head piceous, except gula, genae and base yellowish ; postocular with an obscure yellow stripe

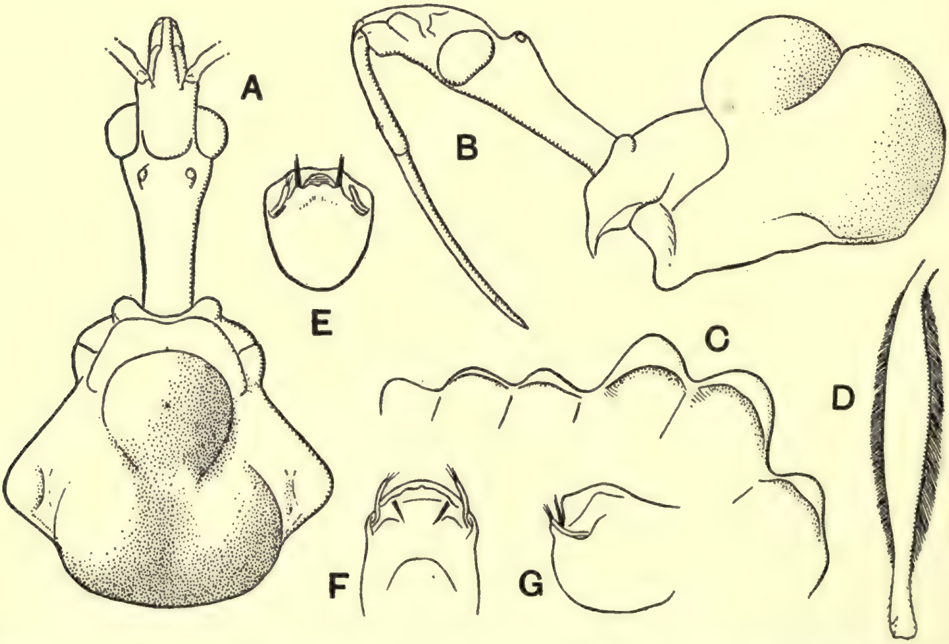

Fig. 29.—*Oedemanota kenyensis* gen. n., sp. n. a. Head and pronotum (dorsal view) ; b. head and pronotum (lateral view) ; c. connexivum (ventral view) ; d. anterior tibia ; e. pygophore (terminal view) ; f. pygophore (dorsal view) ; g. pygophore (lateral view).

between ocelli. Pronotum, pleura, sterna testaceous, the last with faint reddish suffusion. Scutellum piceous. Abdomen testaceous with vinaceous suffusion particularly midventrally. Corium brown; membrane hyaline. Tibiae piceous; anterior tibiae with a red spot on inner and outer surfaces; median and posterior tibiae with a pale yellow annulation in basal half; femora testaceous in basal half, piceous with a pale yellow annulation in apical half; coxae and trochanters testaceous.

	♂	♀
Total length . . .	13·50 mm.	14·50 mm.
Hemelytra	8·50 mm.	9·00 mm.
Greatest pronotal width	3·80 mm.	4·00 mm.

SPECIMENS EXAMINED. One ♂ (holotype), 1 ♀ (paratype), Kenya, Emali Range, Sultan Hamid, 4,900–5,900 ft., iii.1940 (no collector's name).

This new genus is unlike any other known Ethiopian genus. The structure of the pronotum is somewhat similar to that of the Neotropical genus *Notocyrtus* Burmeister 1835, *Handb. Ent.* **2** : 227, and the expanded connexivum with some of the segments globose on the upper surface is not very dissimilar from that of the Oriental genus *Yolinus* Amyot & Serville 1843, *Hist. nat. Ins. Hém.* 358, with the difference that in *Oedemanota* the external margin of some of the segments is deflected, thus forming a concavity on the lower surface.

Gattonocoris gen. n.

SIZE. Small. Basal segment of antennae, head, pronotum and legs tuberculate. Basal segment of antennae a little shorter than head and pronotum together; segments 2 and 3 together one-third as long as basal segment; segment 4 fusiform, thick, somewhat flattened, a little longer than segments 2 and 3 together. Head sub-equal in length to pronotum; vertex wider than an eye; ocelli widely separated elevated; antennophores nearer to eyes than to apex of head; segment 2 of rostrum sub-sinuate, subequal in length to basal segment. Pronotum wider than long; transverse sulcus between lobes ill-defined. Scutellum with an apical spine. Hemelytra extending beyond apex of abdomen; internal cell of membrane half as long and a little wider than external cell basally. Connexival segments very narrow; abdominal spiracles sub-marginal, elevated (except on segment 2). Legs slender; tibiae longer than femora.

Type species: *Gattonocoris horridus* sp. n.

Gattonocoris horridus sp. n.

(Text-fig. 30).

COLOUR. Piceous, except posterior lobe of pronotum, propleural epimeron, acetabula, dark testaceous. Abdomen light brown. Corium brown; membrane faintly yellowish infumate; venation dark infumate. Legs brown; femora dark brown apically and with a narrow, sub-apical yellow annulation. Tubercles on head and body mostly testaceous.

Structure. Basal segment of antennae constricted sub-basally and with extreme base thick; vertex nearly twice as wide as an eye. Posterior margin of pronotum feebly concave; postero-lateral angles not produced. Apical spine of scutellum sub-erect; disc not depressed or excavate. Spiracles on abdomen situated at middle of segments.

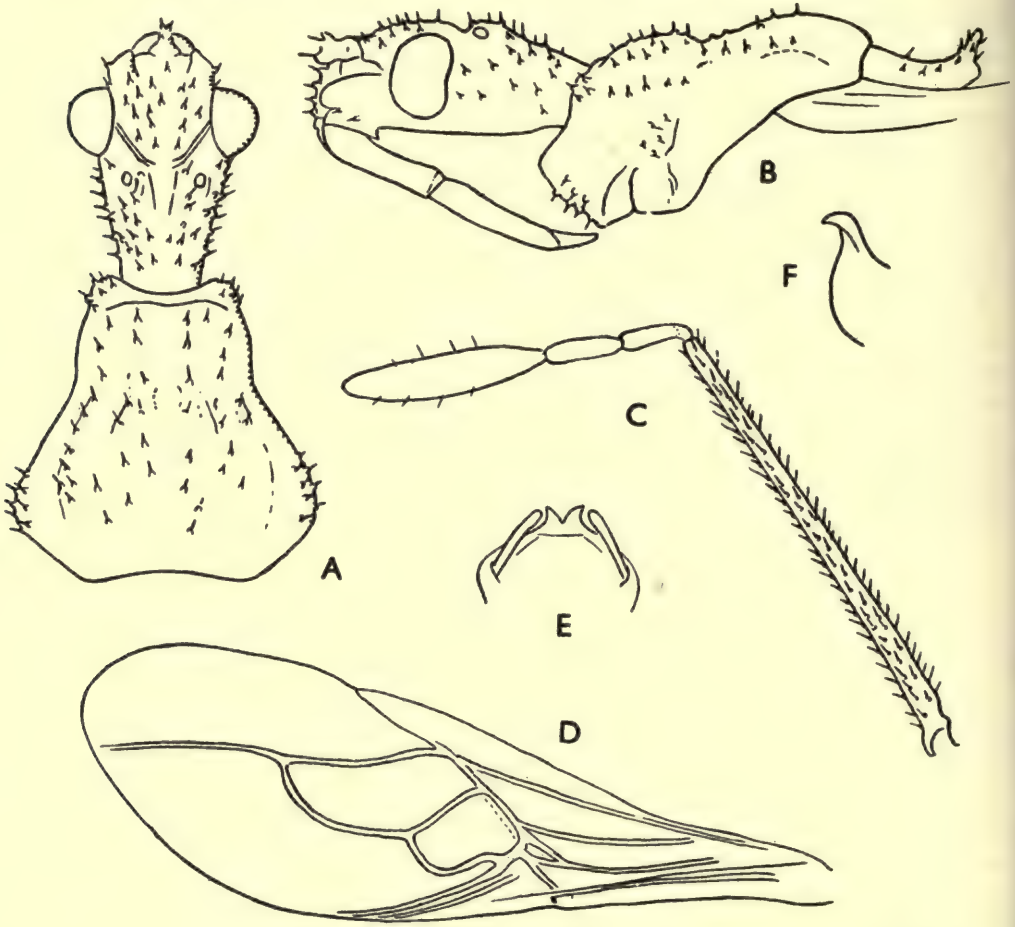

Fig. 30.—*Gattonocoris horridus* gen. n., sp. n. A. Head and pronotum (dorsal view) ; B. head, pronotum and scutellum (lateral view) ; C. antenna ; D. hemelytron ; E. pygophore (dorsal view) ; F. pygophore (lateral view).

Total length	7·50 mm.
Hemelytra	4·20 mm.
Greatest pronotal width	2·00 mm.

SPECIMEN EXAMINED. One ♂ (holotype), Australia, S.E. Queensland, Gatton, 15.1.1932 (no collector's name).

The habitus of this new genus is not very dissimilar from that of *Coranus* Curtis, 1833, *Brit. Ent.* **10** : 453, but the unusual shape and proportions of the antennal segments and the presence of setigerous tubercles on antennae, body and legs separate it from that genus.

Eulyes Am. & Serv.

Eulyes speciosa Miller, *E. miranda* Miller, and *E. kiauana* Miller, 1941, *Journ. F.M.S. Mus.* **18** : 718–20, should not have been placed in the genus *Eulyes* Am. & Serv. Since they cannot be placed in any other genus, the following new one is established for them :

Pareulyes gen. n.

Thorax somewhat compressed dorso-ventrally. Basal segment of antennae equal in length to head. Rostrum moderately thick ; basal segment about half as long as remaining segments together, extending almost to anterior margin of eyes. Head longer than pronotum ; anterior lobe with a short median, longitudinal sulcus basally ; posterior lobe obscurely depressed medially. Hemelytra extending beyond apex of abdomen.

Type species : *Eulyes speciosa* Miller.

Differs from *Eulyes* Amyot & Serville, 1843, *Hist. nat. Ins. Hém.* : 359, in having the basal rostral segment relatively longer, extending almost to anterior margin of eyes and not half as long as anteocular ; segment 2 thick, a little more than twice as long as basal segment, not slender and more than thrice as long as basal segment, the anterior lobe of the pronotum with a very short median longitudinal sulcus and not sulcate throughout, more or less, the posterior lobe without a median sulcus, segment 7 of the connexivum not produced and the tibiae hardly at all narrowed towards apex.

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NATURAL HISTORY

A.

A REVISION OF THE ARHOPALA GROUP

OF

ORIENTAL LYCAENIDAE

(Lepidoptera: Rhopalocera)

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W. H. EVANS

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BY

W. H. EVANS

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INTRODUCTION

THE *Arhopala* group of genera was first constituted as such by De Nicéville (1890). A revision of the group, which he called the *Amblypodia* group (*see* Appendix 1), was published by Bethune-Baker (1903). Swinhoe (1910) elevated the group to subfamily rank, *Amblypodiinae.* Evans (1925, 1932) reverted to the name *Amblypodia* including in the group the genera *Iraota, Horsfieldia, Thaduka, Mahathala* and *Amblypodia* (= *Arhopala*). But in this review I intend to deal only with the last of these genera : no review is needed for the rest of the group. Corbet (1940, see Appendix 1) was the first author to demonstrate clearly that *Arhopala,* as currently used, and not *Amblypodia,* is the correct generic name for the 187 species included in this review, though, as will appear later, I have found it necessary to restrict the application of that name.

Doherty (1889) remarked that *Arhopala* was a cumbrous genus and that every opportunity should be taken of dividing it. This is easier said than done in a convincing manner. Moore for instance created a number of genera, which were not accepted by subsequent authors. What is the definition of a genus ? Long ago I put that question to Professor W. T. M. Forbes : he replied that you want two characters, one of which must be structural. I put the same question to the late Lord Walter Rothschild : he replied that a species was a nature-made entity, but that a genus was a man-made conception created for his own convenience. It is no easy matter to decide whether a particular character difference is of generic value. One should bear in mind that the golden rule is that there is no golden rule and that one cannot modify nature, but that one can adapt one's conceptions to the circumstances of any particular case. I have described and named 124 genera and have tried to keep within the limits, which may be regarded on one hand as Rothschild's abstention from dividing up *Papilio* in his work on that genus, and on the other the division by B. C. S. Warren and others of the well-beloved and well-known genus *Argynnis* into numerous genera based on minor differences in the genitalia.

In my Hesperiid work I found that the genitalia always furnished excellent clues to identification and classification. In the *Arhopala* group the genitalia give very little assistance. But the long ovipositor of *Panchala* and the spiked uncus of *Flos* serve to define these genera, while in certain species (B11 to 14) identification is difficult without a genitalia examination. There is very little variation in venation except in respect of the hind wing cell. Its abnormal shape defines the genus *Arhopala* and its great length separates the new genus *Aurea*. No further structural differences of generic value could be found. One hundred and fifty-eight species remain to be placed in the genus *Narathura*, which has been divided into 12 groups lettered *A* to *L*, the other 4 genera continuing as *M* to *P* for facility of Index reference. The larger groups have been divided into sub-groups.

The general key and the keys for each group and genus have been framed in accordance with the system introduced in my *Identification of Indian Butterflies*. I have also used the same simple abbreviations adopted in that work, viz.: F = fore wing, H = hind wing : upf = upperside of fore wing : unh = underside of hind wing, etc., because these, like the keys, have proved both convenient and easy to operate.

Following the year of publication after the author's name, I have given the type locality and the location of the type, if known ; and a list of the material in the British Museum (Natural History). The early, artist-made illustrations, often badly reproduced, are generally unsatisfactory as it was not recognized that identification is dependent primarily on the disposition of the underside markings. Corbet published good photographs of the undersides in 1946 and of the genitalia in 1941 of the Malayan species. These have been cited, " g " being added for the genitalia figures. For other species the best available figure has been cited (generally from Seitz).

The treatment of the species in the keys may appear uneven. When identification is dependent on a single easily-recognized character, there is no need to say more. Where identification is difficult, as much assistance as is available has been given. In some cases, such as further information about *Panchala* in addition to the genitalia character, any description would have to be lengthy and probably would nevertheless be unsatisfactory. It is assumed that students and collectors will have available some book containing illustrations, such as Seitz.

Subspecies have been arranged from west to east. Generally the differences are " geographical " and are well marked, but in certain cases (e.g. *muta* B4 and *philander* H10) several sub-species appear to fly together, due perhaps to some ecological cause or to " invasions " from other areas.

The Appendix contains details of various nomenclature difficulties and is referred to in the keys.

I have to thank Lt.-Col. J. N. Eliot for a great deal of useful advice and for checking my work: he has saved me from many blunders. Major C. F. Cowan, Lt.-Col. Eliot, Mr. J. A. Hislop, M.C., and Prof. R. C. R. Morrell placed their collections at my disposal and Brigadier A. W. G. Wildey furnished me with a great deal of information about Malaya. Dr. Diakonoff of the Leiden Museum very kindly allowed me to examine the type of *Panchala weelii* Piepers. Mr. H. K. Clench of the Carnegie Museum, Pittsburg, sent me paratypes of species described by Holland. Dr. E. M. Hering as usual was very helpful regarding material in German Museums, Mr. N. D. Riley, C.B.E., and Mr. W. H. Tams assisted me to resolve nomenclature difficulties.

GENERAL KEY TO GENERA AND GROUPS

A (P). ♂ genitalia, sides of uncus at dorsal end rounded.
Aa (O). ♀ ovipositor short and blunt.
Ab (N). H end cell angled, lower part parallel to termen, upper part inclined to midway between the central and outer spots in space 7.
Ac (M). H cell not longer than half the wing.
Genus ***Narathura*** Moore 1878: type ***hypomuta*** Hewitson, fixed by author. One hundred and fifty-eight species in 12 groups.
Synonyms *Nilasera* Morre 1881: type *centaurus* Fabricius, fixed by author. *Satadra* Moore 1884: type ***atrax*** Hewitson, fixed by author. *Darasana* Moore 1884: type ***perimuta*** Moore, fixed by author.

Ad (L). Markings more or less complete.
Ae (C). Unh discal spots in spaces 7, 6, 5 macular and with their centres in line.
Af (B). Tailed.
Anthelus group. Twenty-three species.

B (Af). Not tailed.
Epimuta Group. Twenty-five species.

C (Ae). Not as in Ae.
Ca (K). H tornus more or less produced and angled; termen tailed or dentate.
Cb (J). F termen even, not conspicuously falcate or crenulate. H outer half of dorsum not conspicuously excavate.
Cc (G). Unh discal band completely dislocated at vein 2. Tailed at end of vein 2 H.
Cd (D). H with an additional white-tipped tail at end of vein 3.
Abseus group. Three species.

D (Cd). H no tail at end of vein 3.
Da (E). Unh with a white streak at base of space 8.
Theba group. Four species.

E (Da). Unh with the usual spot at base of space 8.
Ea (F). Unh discal band unbroken from costa to vein 2. H with conspicuously projecting tornal lobe.
Hercules group. Two species.

F (Ea). Unh discal band broken at vein 6 as usual.
Democritus group. Twenty-eight species.

G (Cc). Unh discal band not completely dislocated at vein 2.
Ga (H). Unf discal band broken at vein 4 and the upper part is directed to the termen.
Eumolphus group. Twenty-two species.

H (Ga). Unf discal band unbroken, or only slightly dislocated at vein 4 and the upper part is directed to the dorsum.

Ha (I). H with long tail, ciliate throughout on its dorsal side.

Centaurus group. Fifteen species.

I (Ha). H tail filamentous, a tooth or absent.

Vihara group. Eighteen species.

J (Cb). F termen conspicuously falcate or crenulate. H outer half of dorsum conspicuously excavate.

Rama group. Six species.

K (Ca). H tornus rounded, dorsum and costa sub-equal : termen not tailed or dentate.

Perimuta group. Seven species.

L (Ad). Below, markings more or less incomplete. Unf no basal spot in cell. H termen dentate.

Fulla group. Four species.

M (Ac). H cell longer than half wing : tail short and stout. ♂ above, green.

Genus ***Aurea*** *nov.* : type *Arhopala aurea* Hewitson ; fixed by author. Four species.

N (Ab). H end cell straight and inclined, directed to the central spot in space 7.

Genus ***Arhopala*** Boisduval 1832 : type *phryxus* Boisduval, fixed by Scudder 1870. Five species. Synonym *Iois* Doherty 1889, undescribed, placed as synonym by De Nicéville 1890.

O (Aa). ♀ ovipositor long, tapered, bent down at tip.

Genus ***Panchala*** Moore 1882 : type *ganesa* Moore, fixed by author. Eight species.

Synonym *Acesina* Moore 1884 ; type *paraganesa* De Nicéville, fixed by author.

P (A). ♂ genitalia, sides of uncus at dorsal end produced and pointed. Markings of a different type.

Genus ***Flos*** Doherty 1889 : type *apidanus* Cramer, fixed by author. Thirteen species.

Synonym *Amblypodia* Auctorum *nec* Horsfield (*see* Appendix 1).

Genus ***NARATHURA*** Moore 1878

A. ANTHELUS GROUP OF NARATHURA

1a (9a). Unf with a spot at base of space 10.

Anthelus Sub-group

1b (6a). Unf 1 or more spots in space 11.

1 (2a). Unh 2 spots at base of space 8 ; unf 3 spots in space 11.

anthelus. Nine sub-species. Fig. Corbet 3 and 3 g.

(*a*) ♂ F 30 mm., shining blue, border 2½ mm. at apex to ½mm. at dorsum. ♀ paler blue, upf border 8 mm. at apex to 2 at dorsum.

Sub-sp. ***anthelus*** Doubleday & Hewitson 1852 : ♂ Moulmein ; type B.M. 20 ♂, 18 ♀ Ataran, Burma.

(*b*) Above and below much darker. Unh all markings prominent.

Sub-sp. ***anthea*** Evans 1925 : ♂ Mergui ; type B.M. 4 ♂, 4 ♀ Tavoy. 17 ♂, 17 ♀ Mergui. 11♂, 11♀ Victoria Point. 2 ♂ W. Siam. 1 ♂ Annam. 1 ♂ Peninsular Siam.

(*c*) Intermediate to *anunda*. ♀ more purple.

Sub-sp. ***grahami*** Corbet 1941 : ♂ Malaya ; type B.M. 6 ♂, 5 ♀ Malaya.

(*d*) Darker. ♂ upf border a thread. ♀ purple, border 10 mm. at apex to 5 mm. at dorsum. Below as *anthelus*.

Sub-sp. ***anunda*** Hewitson 1869 : ♂ Borneo ; type B.M. 9 ♂, 3 ♀. Sumatra. 1 ♂ Banka 11 ♂, 3 ♀ Borneo.

(*e*) Above as *anunda*. Below, looking very different; uniform, rather dark brown, markings all equally prominent, instead of the subcostal markings unh being more prominent than the rest: no whitish subcostal area.

Sub-sp. ***majestatis*** Fruhstorfer 1913: ♂ Nias; type B.M. 5 ♂, 6 ♀ Nias.

(*f*) ♂ above, pale shining blue, border as in *anthelus*. Unh markings faint except at costa.

Sub-sp. ***jabadia*** Fruhstorfer 1913: ♂ Java; type B.M. 6 ♂ Java.

(*g*) More like *anunda*, but rather bluer.

Sub-sp. ***saturatior*** Staudinger 1889: Palawan. 7 ♂, 6♀ Palawan.

(*h*) ♂ above blue as *jabadia*, border as *anunda*. Unh much darker, all markings equally conspicuous, subcostal whitish area present. ♀ above brown, darker apically, no blue area.

Sub-sp. ***sotades*** Fruhstorfer 1913: ♂ Mindanao; type B.M. 18 ♂, 8 ♀ Mindanao.

(c) As *sotades*, but ♀ purple-blue with very broad dark borders, 12 mm. at apex to 9 at dorsum; uph 5 mm. mid-termen and veins 2, 3, 4 darkened.

Sub-sp. ***impar*** *nov.*: ♀ Mindoro; type B.M. 10 ♂, 2 ♀ Mindoro.

2a (1). Unh not more than 1 spot at base of space 8.

2 (3a). Unf 2 spots in space 11.

auxesia. Two sub-species. Fig. Seitz, Pl. 150 B *d*.

(*a*) ♀ F 24 mm. Above, very pale blue, whitish mid F and a dark spot end cell; border 5 mm. at apex F to 2 mm. at dorsum; veins darkened.

Sub-sp. ***auxesia*** Hewitson 1862: ♀ Salwatty; type B.M. Also 1 ♀ New Guinea (ex coll. Hewitson).

(*b*) ♀ purple-blue, with whitish bordered dark spot at end of cell. ♂ dark purple-blue, border 1 mm.

Sub-sp. ***salvia*** *nov.*: ♀ Salwatty (ex coll. Hewitson); type B.M. Also 2 ♀ Dutch New Guinea. 2 ♂, 5 ♀ Mefor Is., Geelvink Bay.

3a (2). Unf 1 spot in space 11.

3 (4a). Unh costa broadly darkened, followed by a white fascia from base to termen. ♂ F 23 mm.: pale blue, border 4 mm. at apex to ½ mm. at termen. Fig. Corbet 1 and 1 g.

ijauensis Bethune-Baker 1897: ♂ Perak; type B.M. 21 ♂, 11 ♀ Ataran. 26 ♂, 26♀ Tavoy. 4 ♂, 11 ♀ Mergui. 1 ♂, 8 ♀ Victoria Point. 1 ♂, 1 ♀ Siam. 2 ♂, 8 ♀ Peninsular Siam. 2 ♂ Langkawi Is. 3 ♂ Malaya.

Synonyms *subfasciata* Moore 1883: ♂ Tavoy, type B.M. Homonym of *subfasciata* Moore 1881 (L.4).

simonea Corbet 1941: ♂ Tavoy; type B.M.

4a (3). Unh uniform.

4 (5). Unf spots in spaces 4 to 6 as a band, spot in 7 out of line.

eridanus. Five sub-species. Fig. Seitz 148*a*.

(*a*) As *eridanus*, but unf spots in spaces 7, 10, 11 are much larger and more conspicuous.

Sub-sp. ***dilutior*** Staudinger 1889: ♂ Palawan. 4 ♂, 1 ♀ Palawan. 1 ♂, 1 ♀ Cagayan Is., near Mindanao.

(*b*) ♂ F 27 mm., border a thread. ♀ above generally all brown.

Sub-sp. ***lewara*** Ribbe 1926: ♂ Celebes. 2 ♂, 3 ♀ Celebes.

Synonym *itama* Ribbe 1926: ♀ Celebes; all brown form.

(*c*) ♂ F 25 mm., border 3 mm. at apex to ½ mm. at dorsum. ♀ brown with some blue scaling at bases F and H.

Sub-sp. ***elfeta*** Hewitson 1869: ♀ Sula Mangoli; type B.M. 12 ♂, 5 ♀ Sula Mangoli.

Synonym *viola* Röber 1887: ♂ Bangkei (see Appendix 2).

(*d*) ♂ F 27 mm., as *lewara*. ♀ pale blue basally, outwardly whitening, border F 9 mm. at apex, bearing small blue spots in spaces 4, 5; at dorsum 4 mm.; dark spot end cell; border 10 mm. on H.

Sub-sp. ***padus*** Felder 1865 : ♂ Halmaheira ; type B.M. 18 ♂, 3 ♀ Halmaheira.
(*e*) ♂ F 20 mm., border a thread. ♀ as for *padus*, but seems to be very variable.
Sub-sp. ***eridanus*** Felder 1860 : ♀ Amboina ; type B.M. 1 ♂, 3 ♀ Amboina. 1 ♀ Ceram.
Synonym *polita* Röber 1887 : ♂ Ceram.

5 (4). Unf spots in spaces 4 to 7 on a regular curve.
anarte. Two sub-species. Fig. Corbet 4 and 5 g.
(*a*) ♂ F 30 mm. : shining blue, turning violet apically on F, border 1½ to ½ mm. : ♀ purple blue with broad borders.
Sub-sp. ***anarte*** Hewitson 1862 : ♂ ? loc. ; type B.M. 2 ♂, 1 ♀ Upper Assam. 15 ♂, 5 ♀ Ataran. 2 ♂, 2 ♀ Tavoy. 13 ♂, 4 ♀ Siam. 2 ♂, 1 ♀ Malaya. 1 ♂, 1 ♀ Sumatra. 1 ♂ Borneo.
Synonym *morphicolor* Corbet 1941 : ♂ Malaya ; type B.M.
(*b*) Below, all markings darker. Unf costal spots in spaces 7 and 10 rectangular, overlapping. Unh a more or less conspicuous white streak from base to termen over vein 6.
Sub-sp. ***auzea*** De Nicéville 1896 : ♂ Java. Fig. Corbet 4 g. 1 ♂ Java.

6a (1b). Unf no spot in space 11.
6 (7a). Unf no costal spot in space 10. Large, ♂ F 34 mm. Generally like *anthelus auzea.*
trionoea Semper 1890 : ♂ Mindanao. 1 ♂ Luzon.

7a (6). Unf with a costal spot in space 10.
7 (8). Below, purple washed, markings conspicuous. Unh costal area broadly paler. ♂ F 22 mm., dark blue, border ½ mm. Fig. Corbet 2 and 2 g.
achelous Hewitson 1862 : ♂ Singapore ; type B.M. 4 ♂ Malaya. 12 ♂, 6 ♀ Borneo.

8 (7). Below, uniform brown, markings inconspicuous, hardly darker than ground, no purple wash nor a paler subcostal area unh. Above as *achelous*.
brooksiana Corbet 1941 : ♂ Sumatra ; type B.M. 1 ♂ Mergui. 1 ♂ Malaya. 4 ♂, 1 ♀ Sumatra. 1 ♂ Batoe Is.
Synonym *malu* Corbet 1946 : ♂ Mergui ; type B.M.

9a (1a). Unf no spot at base of space 10.
9b (18a). Unf discal markings macular.

Camdeo Sub-group

9 (10a). Unf with a spot at base of space 7. ♂ F 18 mm., entirely dark brown, except for basal blue scaling. ♀ pale blue with broad dark borders. Fig. Seitz 148*b*.
annulata Felder 1860 : ♂ Amboina ; type B.M. 2 ♂ Palawan. 1 ♀ Philippines. 1 ♂ Celebes. 14 ♂, 3 ♀ Amboina. 1 ♀ Buru.
Synonyms *tristis* Röber 1887 : ♀ Bangkei.
erebina Staudinger 1889 : ♂ Palawan.

10a (9). Unf no spot at base of space 7.
10 (11a). Unf no discal spot in space 7.
johoreana. Two sub-species. Fig. Corbet 10.
(*a*) ♀ F 20 mm. Above purple-blue, border 5 mm. at apex to 2 at dorsum : H 4 mm. and veins broadly darkened.
Sub-sp. ***johoreana*** Corbet 1941 : ♀ Malaya ; type B.M. 2 ♀ Malaya.
(*b*) ♂ 18 mm., sexes alike, blue, not purple, border 4 mm. at apex to 2 mm. at dorsum : H 3 mm., veins not darkened.
Sub-sp. ***kalima*** *nov.* : ♂ Nias ; type B.M. 4 ♂, 1 ♀ Nias.

11a (10). Unf with a discal spot in space 7.

11 (12a). Unf the spot in space 7 in continuation of those in spaces 4 to 6. ♂ F 21 mm., pale silvery metallic blue, border 1 mm. at apex, vanishing at dorsum. ♀ bluish-white with broad border and dark spot at end cell. Unh whitish below costa inside the discal band.

varro Fruhstorfer 1913 : ♀ Karen Hills. Fig. Corbet 7 and 13 g as *karennia*. 3 ♂, 3 ♀ Karens. 1 ♀ Ataran.

Synonym *karennia* Evans 1925 : ♂ Karens ; type B.M.

12a (11). Unf spot in space 7 detached from rest of band.

12b (14a). Unf lower part of end-cell spot expanded and the central spot in space 1b elongate.

12 (13). Below, markings conspicuously white-edged.

dispar. Four sub-species. Fig. Corbet 8 and 11 g.

(*a*) ♂ F 26 mm., plain blue, border a thread. ♀ much darker blue than *dispar* and borders broader, 7 mm. F and 10 mm. H ; a black spot at end of cell F. Below as *dispar*.

Sub-sp. ***diluta*** Evans 1932 : ♂ Maymyo ; type B.M. 26 ♂, 26 ♀ N. Shan States. Fig. Corbet 12 g.

(*b*) ♂ upf with a dark spot end cell surrounded by a whitish area. Unf discal band broad. ♀ above, pale blue with 2½ mm. border F and 1 mm. H.

Sub-sp. ***dispar*** Riley & Godfrey 1921 : ♂ N. Siam ; type B.M. Also 1 ♂, 3 ♀ S. Shan States, Burma.

(*c*) Above, as *diluta* : below no white areas, markings large. ♀ bluish-purple with broad borders.

Sub-sp. ***fracta*** *nov.* : ♂ Karen Hills ; type B.M. 3 ♂, 2 ♀ Karens. Also 1 ♀ " Margherita, Assam ".

(*d*) ♂ F 22 mm. Above as *diluta*, but the second specimen has a dark spot at end of cell upf and a whitish area around it. Below, as *dispar*, but markings smaller.

Sub-sp. ***chota*** *nov.* : ♂ Ataran, Burma ; type B.M. 2 ♂ Ataran.

(*e*) ♀ F 25 mm. Above, broadly white about a black spot at end of cell. Below mostly white with reduced markings. Fig. Corbet 9. Unique.

Sub-sp. ***pendleburyi*** Corbet 1941 : ♀ Malaya ; type B.M.

13 (12). Below, markings inconspicuous, edged pale brown.

semperi. Two sub-species.

(*a*) ♂ pale purple, border a thread. ♀ purple, no whitish area beyond end cell. Fig. Corbet 6 and 9 g.

Sub-sp. ***camdana*** Corbet 1941 : ♀ Malaya ; type B.M. 1 ♂, 1 ♀ Malaya. ♂ 1, 1 ♀ Sumatra.

(*b*) ♂ F 25 mm., purple, border 1½ mm. at apex to 1 at dorsum : conspicuous black spot at end cell. ♀ purple, whitish about end cell upf, border 5 mm.

Sub-sp. ***semperi*** Bethune-Baker 1896 : ♂ Borneo ; type B.M. 2 ♂, 1 ♀ Borneo.

Synonym *panthera* Corbet 1946 : ♀ Borneo ; type B.M.

14a (12b). Unh lower part end-cell spot not expanded and central spot in space 1b not elongate.

14b (17). Unf discal spots in spaces 2, 3 not smaller than those in spaces 4 to 6.

14c (16). Below, grey, markings black, conspicuous.

14 (15). Below pale grey. ♂ F > 25 mm.

camdeo. Two sub-species. Fig. Seitz 149*d*.

(*a*) ♂ F 29 mm., pale violet-blue with a discal white area, border a thread, usually a prominent end-cell spot.

Sub-sp. ***camdeo*** Moore 1857 : N. India ; type B.M. 12 ♂, 12 ♀ Sikkim. 27 ♂, 27 ♀ Assam. 1 ♂, 2 ♀ N. Burma. 2 ♂, 2 ♀ Ataran. 1 ♂ Siam. 3 ♂ Tonkin.

(*b*) Smaller, ♂ F 25 mm. ♀ without the double spot beyond end cell upf. Below, markings not so black and rather larger.

Sub-sp. ***sebonga*** Tytler 1926 : ♂ Manipur ; type B.M. 5 ♂ Manipur. 1 ♂, 2 ♀ N. Burma.

15 (14). Below dark grey. ♂ F < 25 mm.

opalina. Two sub-species. Fig. Corbet 5 and 8 g.

(*a*) Like *camdeo*, but much smaller, ♂ F 19 mm.

Sub-sp. ***opalina*** Moore 1880 : ♂ " Assam " ; type B.M. and 3 ♂, 1 ♀ Siam.

(*b*) ♂ F 22 mm. Above, no white area or dark spot at end of cell upf. ♀ generally all blue above and small white area may be present beyond end of cell.

Sub-sp. ***fruhstorferi*** Röber 1897 : ♀ " Java " ; type B.M. ; figured by Piepers & Snellen 1918, *Rhop. Java*, Pl. 24, fig. 108 as *aedias* but unknown to authors : probably from Burma. 5 ♂, 3 ♀ Karens. 3 ♂, 3 ♀ Ataran. 2 ♂, 2 ♀ Tavoy. 2 ♂, 2 ♀ Sumatra.

Synonym *sphendale* Fruhstorfer 1914 : ♂ Annam ; type lost.

16 (14c). Below, brown, markings inconspicuous. ♂ F 24 mm., above pale blue, border a thread. ♀ uniform pale purple blue, border F tapering from 4 mm. at apex to 2 mm. at dorsum : spot at end cell, but no spot beyond it as in *opalina*. Fig. Corbet 11 and 10 g.

azata De Nicéville 1895 : ♂ Perak. The figures in *Rhop. Java* are of *aedias*. 1 ♂ Victoria Point, S. Burma. 5 ♂ Malaya. 2 ♂, 1 ♀ Sumatra.

17 (14b). Unf discal spots in spaces 2, 3 smaller than those in spaces 4 to 6. ♂ F 28 mm., shining purple-blue, border a thread ; like *aedias*. Unf narrow white bar across middle of space 1b : rarely spots at bases of spaces 10 and 7.

hellada. Two sub-species. Fig. Corbet 13 and 7 g.

(*a*) Generally markings below fainter.

Sub-sp. ***ozana*** Fruhstorfer 1914 : ♂ Sumatra ; type B.M. 6 ♂, 4 ♀ Malaya. 9 ♂, 5 ♀ Sumatra. 1 ♂ Borneo.

(*b*) Below, markings darker.

Sub-sp. ***hellada*** Fruhstorfer 1914 : ♂ Nias ; type B.M. 9 ♂, 1 ♀ Nias.

18a (9b). Unf discal markings banded, including spots in spaces 2 and 3.

Aedias Sub-group

18 (19a). Unf discal spot in space 7 out of line with those in spaces 4 to 6 ; no white bordered dark area in the basal half of space 1b, as in the very similar *hellada*.

aedias. Five sub-species. Fig. Corbet 14 and 14 g as *agnis*.

(a) ♂ F 24 to 29 mm., pale shining blue, turning violet at apex. ♀ with 2 forms, typically blue, border as at apex 8 mm., tapering to 1 mm. at dorsum, 3 mm. on H ; second form 10 mm. at apex, 4 mm. at dorsum and 8 mm. on H.

Sub-sp. ***yendava*** Grose-Smith 1887 : ♀ Yendaw Valley, Burma ; type B.M. 10 ♂, 2 ♀ Karens. 17 ♂, 3 ♀ Ataran.

Synonym *pallida* Evans 1932 : ♂ Karens ; type B.M.

(*b*) Intermediate : ♀ generally blue as in *yendava*.

Sub-sp. ***meritatas*** Corbet 1941 : ♂ Mergui ; type B.M. 1 ♂ Tavoy. 8 ♂, 5 ♀ Mergui. 2 ♀ Victoria Point, S. Burma.

(*c*) ♂ 20 to 30 mm., dark shining blue border a thread. ♀ purple, border 3 to 10 mm. on F and H, variable. Unf discal markings variable, spots in spaces 4 and 7 are usually out of line with those in spaces 2, 3 ; may be a costal spot in space 10, rarely a spot at base of space 10 and more rarely a spot in space 11.

Sub-sp. ***agnis*** Felder 1865 : ♂ Malacca ; type B.M. 1 ♂ Peninsular Siam. 25 ♂, 6 ♀ Malaya. 19 ♂, 13 ♀ Sumatra. 2 ♂ Banka. 18 ♂, 11 ♀ Nias. 18 ♂, 5 ♀ Borneo. 1 ♂ " E. Java ".

Synonyms *soter* Fruhstorfer 1913 : ♂ Sumatra ; type B.M.
sphetys Fruhstorfer 1913 : ♂ Nias ; type B.M.
hagius Fruhstorfer 1913 ; ♂ " E. Java " ; type B.M.

(*d*) ♂ F 23 mm., pale shining blue, no purple or violet tinge. ♀ still paler, border 5 mm. Fig. Corbet 15 g.

Sub-sp. ***aedias*** Hewitson 1862 : ♀ Java ; type B.M. 8 ♂, 1 ♀ Java. In *Rhop. Java* fig. of *aedias* is *fruhstorferi* and *azata* is *aedias*.

Synonym *pangeran* Fruhstorfer 1914 : ♂ W. Java ; type B.M.

(*e*) Only differs from *agnis* in being smaller and less variable on the underside.

Sub-sp. ***oenotria*** Hewitson 1869 : ♂ Mindanao. 18 ♂ Mindanao.

19a (18). Unf discal spot in space 7 in line with those in spaces 4 to 6.
19b (23). Unf discal spot in space 4 in line with those in spaces 5 to 7.
19c (22). Unf discal band broken at vein 4.
19 (20a). Unh lower part of end-cell spot expanded.

myrzala. Three sub-species. Fig. Corbet 12 and 6 g as *lammas*.

(*a*) Unh in space 7, white edges to central and discal spots looped together. ♂ F 21 mm., dark violet blue, border 1 mm. ♀ blue.

Sub-sp. ***conjuncta*** Corbet 1941 : ♂ Langkawi Is. ; type B.M. 6 ♂, 2 ♀ Langkawi Is.

(*b*) ♂ duller. ♀ purple.

Sub-sp. ***lammas*** Corbet 1941 : ♂ Malaya ; type B.M. 5 ♂ Malaya. 5 ♂, 3 ♀ Borneo.

(*c*) Unh in space 7 the entire space between the central and discal spots filled by a conspicuous white spot.

Sub-sp. ***myrzala*** Hewitson 1869 : ♂ Mindanao. 10 ♂, 6 ♀ Mindanao.

20a (19). Unh lower part of end-cell spot not expanded.
20 (21). Unf discal band continued into space 1b. ♂ F 21 mm., dark purple-blue, border 3 mm. ♀ paler, border 5 mm. ; on H blue colouring very restricted. Fig. Seitz 148*d*.

dohertyi Bethune-Baker 1903 : ♂ Celebes ; type B.M. 23 ♂, 14 ♀ Celebes.

21 (20). Unf discal band not continued into space 1b. ♂ F 20 mm., dark violet-blue, border ¾ mm. Fig. Corbet 15 and 17 g as *pseudomuta* (see Appendix 5).

delta *nov.* : ♂ Malaya ; type B.M. 6 ♂, 1 ♀ Malaya. 3 ♂, 7 ♀ Sumatra. 2 ♀ Borneo.

22 (19c). Unf discal band not broken at vein 4.

allata. Five sub-species. Fig. Corbet 16 and 18 g as *pandora*.

(*a*) ♀ purple. Below suffused purple. ♂ F 22 mm.

Sub-sp. ***suffusa*** Tytler 1915 : ♂ Manipur ; type B.M. 3 ♂, 1 ♀ Manipur.

(*b*) ♀ blue. Below as *suffusa*.

Sub-sp. ***atarana*** Tytler 1926 : ♀ Ataran ; type B.M. 1 ♀ N. Burma. 1 ♂ N. Shan States. 1 ♀ S. Shan States. 4 ♂, 4 ♀ Ataran.

(*c*) Below, not suffused purple. ♂ F border 1½ mm. ♀ blue.

Sub-sp. ***pandora*** Corbet 1941 : ♂ Malaya ; type B.M. 2 ♂, 3 ♀ Malaya. 2 ♂, 2 ♀ Sumatra.

(*d*) ♀ purple, otherwise as *pandora*.

Sub-sp. ***evandra*** Corbet 1941 : ♂ Borneo ; type B.M. 2 ♂, 2 ♀ Borneo.

(*e*) Larger, ♂ F 24 mm., border 1 to 2 mm. ♀ purple.

Sub-sp. ***allata*** Staudinger 1889 : ♂ Palawan. 4 ♂, 2 ♀ Palawan. 1 ♂ Mindanao. 2 ♂, 2 ♀ Mindanao.

23 (19*b*). Unf discal spot in space 4 out of line with the spots in spaces 5 to 7. ♂ F 22 mm., upf with a discal area of modified scales, as in *epimuta*.

atosia. Five sub-species. Fig. Corbet 17 and 16 g as *malayana*.

(*a*) ♂ above, pale silvery blue, shading to violet : ♀ pale blue.

Sub-sp. **aria** Evans 1932 : ♂ Karens ; type B.M. 12 ♂, 5 ♀ Karens. 18 ♂, 18♀ Ataran. 22 ♂, 16♀ Tavoy. 4 ♂, 4 ♀ Mergui.

(*b*) ♂ above, uniform violet-blue ; ♀ blue.

Sub-sp. **malayana** Bethune-Baker 1903 : ♂ Singapore ; type B.M. 5 ♂, 3 ♀ Mergui. 5 ♂, 5 ♀ Siam. 2 ♂ Indo-China. 4 ♂, 4 ♀ Peninsular Siam. 4 ♂, 6 ♀ Langkawi Is. 20 ♂, 16 ♀ Malaya. 1 ♀ " Java ".

Synonyms *jahara* Corbet 1941 : ♂ Mergui ; type B.M.

udapa Corbet 1941 : ♂ Malaya : type B.M.

(*c*) ♂ uniform violet-blue. ♀ purple.

Sub-sp. **atosia** Hewitson 1863 : ♂ Sumatra ; type B.M. 15 ♂, 6 ♀ Sumatra. 6 ♂, 9 ♀ Banka. 16 ♂, 13 ♀ Borneo. 4 ♂ Pulo Laut.

(*d*) Like *aria*, but borders rather broader.

Sub-sp. **lurida** Corbet 1941 : ♂ Mentawi Is. ; type B.M. 1 ♂, 1 ♀ Mentawi Is.

(*e*) Like *aria*, but ♂ upf area of modified scales faint.

Sub-sp. **aricia** Staudinger 1889 : ♂ Palawan. None in B.M.

B. EPIMUTA GROUP OF NARATHURA

1a (23a). Unf no spots between cell and costa.

1b (21a). Unf end-cell spot of uniform width throughout.

1c (11a). Unh discal band dislocated at vein 2 completely or so that the spots on either side do not overlap more than the the extent of the inner edge of the spot in space 2 being in line with the outer edge of the spot in space 1c.

Epimuta Sub-group

1d (3a). Unf discal spot in 4 not in line with those in spaces 5, 6.

1 (2). Unf discal spot in space 4 out of line with those in spaces 3, 2. ♂ upf 22 mm. with discal area of modified scales as in *atosia*.

epimuta. Three sub-species. Fig. Corbet 20 and 20 g.

(*a*) ♂ shining pale blue, turning violet towards apex F, border 2 mm. at apex, tapering to 1 mm. at dorsum and ½ mm. on H. ♀ shining blue, border 7 mm. at apex tapering to 2 mm. at dorsum and ½ mm. on H. Smaller.

Sub-sp. **elsiei** Evans 1925 : ♂ Tavoy ; type B.M. 10 ♂, 1 ♀ Tavoy. 18 ♂, 18 ♀ Mergui. 7 ♂, 1 ♀ Victoria Point. 3 ♂, 1 ♀ Peninsular Siam.

(*b*) Intermediate. ♂ as *epimuta*. ♀ blue rather than purple.

Sub-sp. **epiala** Corbet 1941 : ♂ Malaya ; type B.M. 17 ♂, 19 ♀ Malaya. 19 ♂, 13 ♀ Sumatra. 5 ♂, 1 ♀ " Java ".

(*c*) ♂ uniform shining blue, border a thread. ♀ purple with broad borders.

Sub-sp. **epimuta** Moore 1857 : ♂ Borneo ; type B.M. 19 ♂, 13 ♀ Borneo.

2 (1). Unf discal spot in space 4 more or less in line with those in spaces 3, 2. ♂ upf no area of modified scales.

hypomuta. Two sub-species. Fig. Corbet 23 and 19 g.

(*a*) ♂ F 14 to 20 mm., shining dark purple-blue, border a thread. ♀ shining deep blue, border 2½ mm.

Sub-sp. **hypomuta** Hewitson 1862 : ♂ ? loc. ; type B.M. 2 ♂, 1 ♀ Langkawi Is. 4 ♂, 2 ♀ Malaya. 1 ♂, 2 ♀ Sumatra.

(*b*) ♀ F border 4 mm.

Sub-sp. **deva** Bethune-Baker 1896 : ♂ Borneo ; type B.M. 3 ♂, 9 ♀ Banka. 21 ♂, 27 ♀ Borneo.

Synonym *shelfordi* Moulton 1911 : ♀ Borneo ; type B.M.

3a (1d). Unf discal spot in space 4 in line with those in spaces 5, 6.

3b (5a). Unf discal band conspicuously angled mid-space 4 and continuous from spot in space 6 to spot in space 3.

3 (4). Unf discal spots in spaces 2, 3 in line.

metamuta. Two sub-species. Fig. Corbet 22 and 22 g.

(*a*) ♂ F 18 mm., upf dark purple-blue, uph shining light blue, very strongly contrasting, border 1½ mm. ♀ blue, border 3 mm.

Sub-sp. ***metamuta*** Hewitson 1862 : ♂ Sumatra ; type B.M. 5 ♂, 4 ♀ Malaya. 16 ♂, 6 ♀ Sumatra.

Synonym *gunongensis* Bethune-Baker 1897 : ♂ Perak ; type B.M.

(*b*) Uph darker shining blue in ♂ and upf border ¾ mm.

Sub-sp. ***hilda*** *nov.* : ♂ Borneo ; type B.M. 4 ♂, 1 ♀ Borneo.

4 (3). Unf discal spot in space 2 out of line, nearer termen.

muta. Nine sub-species. Fig. Corbet 24 g. At either end of its range *muta* is constant, but from Malaya to Borneo there appear to be several forms flying together. They were regarded as species by Corbet (1941), but are now believed to be sub-species.

(*a*) ♂ 18 to 20 mm., shining metallic blue, completely overlaid violet on F, border 1½ mm. ♀ pale blue to violet, border 7 mm. at apex to 2 mm. at dorsum. (The *metamuta* of Evans 1932.)

Sub-sp. ***merguiana*** Corbet 1941 : ♂ Mergui ; type B.M. 4 ♂, 4 ♀ Karens. 14 ♂, 14 ♀ Ataran. 8 ♂, 1 ♀ Tavoy. 7 ♂, 11 ♀ Mergui. 2 ♂, 2 ♀ Victoria Point. 1 ♀ Siam. 2 ♂, 1 ♀ Peninsular Siam.

(*b*) ♂ F 19 mm. uph shining blue contrasting with the violet upf, but not so greatly as in ***merguiana.*** Fig. Corbet 25 g.

Sub-sp. ***maranda*** Corbet 1941 : ♂ Malaya ; type B.M. 12 ♂, 13 ♀ Malaya.

(*c*) ♂ F 13 to 18 mm., plain shining blue, border 1½ mm. ♀ darker and smaller than *maranda*. Fig. Corbet 25 g.

Sub-sp. ***tropaea*** Corbet 1941 : ♂ Johore ; type B.M. 15 ♂, 8 ♀ Malaya.

Synonyms *busa* Corbet 1941 : ♂ Malaya ; type B.M. Fig. Corbet 25 g.

santava Corbet 1941 : ♂ Singapore ; type B.M.

(*d*) Grades from ***merguiana*** to *waterstradti*.

Sub-sp. ***trima*** Corbet 1941 : ♂ Sumatra ; type B.M. 27 ♂, 27 ♀ Sumatra.

(*e*) Smaller, ♂ F 17 mm., uniform blue, borders broad, 1½ to 2 mm. ♀ border up to 5 mm. Fig. Corbet 25 and 26 g.

Sub-sp. ***wallacei*** Corbet 1941 : ♂ Sumatra ; type B.M. 6 ♂, 18 ♀ Sumatra. 8 ♂, 1 ♀ Banka.

(*f*) Almost exactly as ***merguiana*** ♂, smaller, ♂ F 18 mm., border 1½ mm. Below, very much darker ochreous-brown.

Sub-sp. ***gloria*** *nov.* : ♂ Nias ; type B.M. 7 ♂, 6 ♀ Nias.

(*g*) Large, ♂ F 20 mm., bright shining purple-blue, border 2 mm., F and H. ♀ shining blue, border 6 mm. at apex to 3 mm. H.

Sub-sp. ***waterstradti*** Bethune-Baker 1896 : ♂ Kina Balu. 23 ♂, 24 ♀ Kina Balu, Borneo.

(*h*) Smaller and duller, border generally broader on H. ♀ purple rather than blue, borders 4 mm. F and H.

Sub-sp. ***moorei*** Bethune-Baker 1896 : ♂ Labuan ; type B.M. 1 ♂, 1 ♀ Labuan. 10 ♂, 7 ♀ Pulo Laut. 20 ♂, 2 ♀ Borneo.

Synonym *daganda* Corbet 1941 : ♂ Borneo ; type B.M.

(*i*) ♂ F 20 mm., very pale shining blue, violet tinge on F, border ¾ mm. ♀ very pale blue, border 3 mm. at apex to 1 mm. at dorsum.

Sub-sp. ***muta*** Hewitson 1862 : ♂ Java. 21 ♂, 21 ♀ Java.

5a (3b). Unf discal band not angled mid space 4, but more or less broken at vein 4.

5b (9a). Unf markings well defined. ♂ F 17 to 20 mm.

5c (7a). Unh spots mid-cell and mid-space 1c enlarged and approximate.

5 (6). Unf discal spot in space 3 elongate, out of line and longer than the rest. ♂ F 20 mm., very dark blue, border a thread. Fig. Corbet 24 and 27 g.

kurzi Distant 1885 : ♂ Malacca. 14 ♂, 7 ♀ Malaya.

6 (5). Unf discal spot in space 3 as rest of band, which is broader than usual. ♂ F 19 mm., dark purple-blue, border ½ mm. Below, dull brown, markings rather darker than ground.

sceva Bethune-Baker 1903 : ♂ Sumatra. 2 ♂ Sumatra.

7a (5c). Unh spots mid-cell and mid-space 1c small, rounded and wide apart.

7 (8). Unf in space 1b an outwardly white-edged dark spot under the central cell spot and a tiny brown dot between the discal and the basal spots in space 2. ♂ F 20 mm., purple-blue, border 1 mm. F produced and below, plain brown as in *kurzi*. ♀ purple, borders 6 mm.

indra *nov.* : ♂ Borneo ; type B.M. 6 ♂, 2 ♀ Borneo.

8 (7). Unf no such markings in space 1b. ♂ F 20 mm. Like *baluensis* but wings more produced and termen straighter. Below markings broad, as in *kurzi* and *sceva*.

siabra Corbet 1941 : ♂ Pulo Laut ; type B.M. 2 ♂ Pulo Laut.

9a (5b). Unh markings faint, ill defined. Small.

9 (10). Above, very dark purple-blue, border a thread. ♂ F 17 mm. ♀ purple, border 4 to 3 mm.

alica *nov.* : ♂ Borneo : type B.M. 3 ♂, 1 ♀ Borneo.

10 (9). Above, bright shining purple-blue, border 1½ mm. ♂ F 16 mm. ♀ bluer, border 4 mm. at apex F to 2 mm. at dorsum.

avathina. Two sub-species. Fig. Corbet 23 g.

(*a*) Above, bluer.

Sub-sp. ***avathina*** Corbet 1941 : ♂ Malaya ; type B.M. 4 ♂, 4 ♀ Malaya.

(*b*) Above, more purple.

Sub-sp. ***neon*** Corbet 1941 : ♂ Sumatra ; type B.M. 2 ♂, 2 ♀ Sumatra. 1 ♂ Borneo. 3 ♂, 1 ♀ Pulo Laut.

Synonym ***xenon*** Corbet 1941 : ♂ Pulo Laut; type B.M.

11a (1c). Unh discal band incompletely dislocated at vein 2, more or less overlapping.

Amphimuta Sub-group

11b (18a). Unh discal band irregular, due to spot in space 3 being out of line.

11c (16a). ♂ uph space 6 not entirely blue.

11d (14a). ♂ clasp undivided.

11 (12a). ♂ clasp hourglass-shape. ♂ F 20 mm., varying from blue to very dark purple-blue, border broad, 2 to 1½ mm.

agesilaus. Three sub-species. Fig. Corbet 69 and 31 g as *gesa*.

(*a*) ♂ above much brighter blue. ♀ also bluer.

Sub-sp. ***gesa*** Corbet 1938 : ♂ Langkawi Is. ; type B.M. 5 ♂, 4 ♀ Mergui. 1 ♂ Peninsular Siam. 1 ♂, 1 ♀ Langkawi Is. 1 ♂, 3 ♀ Malaya. 1 ♂, 2 ♀ Sumatra. 3 ♂, 1 ♀ Banka.

(*b*) ♂ dark blue. ♀ purple with very broad borders.

Sub-sp. ***agesilaus*** Staudinger 1889 : ♂ Palawan. 6 ♂, 2 ♀ Borneo. 6 ♂, 1 ♀ Palawan.

(*c*) ♂ F 18 mm., very dark blue, border 2 mm. F, 4 mm. H. ♀ border 4 mm. F and H all brown except some blue scaling in the cell.

Sub-sp. ***philippa*** *nov.* : ♂ Mindanao ; type B.M. 15 ♂, 11 ♀ Mindanao. 1 ♂, 1 ♀ Mindoro.

12a (11). ♂ clasp not hourglass-shape.

12 (13). ♂ F 18 to 19 mm., wings more rounded. ♂ dark blue border ½ mm. ♀ shining purple-blue, border 3 mm. at apex to 1 or 2 mm. at dorsum and on H. Below markings smaller and more macular. End of clasp rounded.

baluensis Bethune-Baker 1904 : ♂ Kina Balu ; type B.M. Fig. Corbet 30 and 34 g. 27 ♂, 8 ♀ Borneo. 1 ♂ Pulo Laut.

13 (12). ♂ F 21 mm., termen straight. ♂ lighter blue, borders broad. End of clasp tapered.

major Two sub-species. Fig. Corbet 28 and 32 g.

(*a*) ♂ F 21 mm., bright shining blue, border 3 mm. at apex to 2 mm. at dorsum and on H. ♀ blue. Looks very different from *major* and *agesilaus gesa.*

Sub-sp. ***norda*** *nov.* : ♂ Langkawi Is. ; type B.M. 2 ♂, 3 ♀ Langkawi Is.

(*b*) Rather darker and with broader borders.

Sub-sp. ***major*** Staudinger 1889 : ♂ Malacca. 4 ♂, 4 ♀ Malaya. 16 ♂, 16 ♀ Sumatra. 26 ♂, 37 ♀ Borneo.

14a (11d). Clasp divided.

14 (15). ♂ rather bright purple-blue, border broad. Like *major* and *agesilaus*, difficult to separate without examining the genitalia clasp.

catori. Two sub-species.

(*a*) ♂ F 21 mm., border 1 mm.

Sub-sp. ***milleriana*** Corbet 1941 : ♂ Langkawi Is. ; type B.M. 4 ♂, 1 ♀ Mergui. 1 ♂ Victoria Point. 1 ♂ Siam. 2 ♂, 1 ♀ Peninsular Siam. 1 ♂ Langkawi Is. 1 ♂ Penang. 1 ♂ Nias.

(*b*) ♂ F border broader, 2 to 5 mm. Very variable unh, where the costal markings are often absent.

Sub-sp. ***catori*** Bethune-Baker 1903 : ♂ Borneo ; type B.M. Genitalia of type checked : Bethune-Baker's genitalia fig. is from a specimen of *major.* 1 ♂ Peninsular Siam. 11 ♂, 1 ♀ Malaya. 9 ♂, 7 ♀ Sumatra. 42 ♂, 7 ♀ Borneo. 4 ♂ Pulo Laut. 1 ♂ Biliton. 3 ♂ Labuan. 1 ♂ Palawan. 3 ♂ " Java ".

15 (14). ♂ very dark blue, border narrow, ½ mm. ♀ bright violet-blue with broad borders.

amphimuta. Two sub-species. Fig. Corbet 29 and 33 g.

(*a*) ♂ 21 mm. : upf no modified scales.

Sub-sp. ***amphimuta*** Felder 1860 : ♂ Malaya ; type B.M. 13 ♂, 2 ♀ Malaya. 8 ♂, 1 ♀ Sumatra. 1 ♂ Banka. 9 ♂, 1 ♀ Borneo. 1 ♂ " Philippines ".

Synonym *asia* De Nicéville 1893 : ♂ Malaya. Fig. Corbet 31 and 35 g.

(*b*) Genitalia and general appearance do not differ, but upf with a central area of modified scales as in *epimuta.* Unf discal band unbroken. Unh with a strong purple gloss.

Sub-sp. ***quadra*** *nov.* : ♂ Java ; type B.M. Unique.

16a (11c). ♂ uph space 6 all blue : ♂ F 20 mm., border a thread.

16 (17). Below markings faint.

moolaiana. Four sub-species. Fig. Corbet 27 and 30 g.

(*a*) ♂ above, brilliant shining pale blue, turning to violet on apical half F. ♀ pale blue, border 7 mm. at apex to 3 mm. at dorsum, 1½ mm. on H.

Sub-sp. ***moolaiana*** Moore 1878 : ♂ Tenasserim ; type B.M. 13 ♂, 9 ♀ Karens. 20 ♂, 20 ♀ Ataran. 18 ♂, 18 ♀ Tavoy.

Synonyms *pastorella* Doherty 1889 : ♂ Tavoy ; type B.M.

pagaiensis Ollenbach 1921 : ♂ Tavoy ; type B.M.

(*b*) ♂ uniform shining blue. ♀ darker, borders narrower and traces of a dark spot beyond end cell upf.

Sub-sp. ***maya*** Evans 1932 : ♂ Mergui ; type B.M. 14 ♂, 15 ♀ Mergui. 3 ♂, 4 ♀ Victoria Point. 2 ♂, 2 ♀ Peninsular Siam. 1 ♂ " Java ".

(*c*) ♂ uniform purple-blue. ♀ purple-blue.

Sub-sp. ***yajuna*** Corbet 1941 : ♂ Malaya ; type B.M. 9 ♂, 5 ♀ Malaya. 9 ♂ Sumatra. 11 ♂, 2 ♀ Borneo.

(*d*) ♂ F 18 mm., as *maya*. ♀ pale blue with very broad border, 9 mm. at apex to 4 mm. at dorsum F and on H.

Sub-sp. ***klossi*** Corbet 1941 : ♂ Sipora ; type B.M. 1 ♂ Sipora. 1 ♀ Siberut. 1 ♀ N. Pagi Is.

17 (16). Below, markings conspicuous. ♂ ♀ above, as *moolaiana*.

hesba Hewitson 1869 : ♂ Mindanao. 10 ♂, 1 ♀ Mindanao.

18a (11b). Unh discal band regular from space 2 to space 7, spot in space 3 in line.

18 (19a). Below, markings very faint. ♂ F 17 mm., purple-blue, border 1 mm.

***zylda*.** Two sub-species. Fig. Corbet 33 and 29 g.

(*a*) Small, ♂ 16 mm., bright shining blue, ♀ paler blue, border 5 mm. at apex to 2 mm. at dorsum F. Fig. Corbet 34.

Sub-sp. ***elioti*** Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂, 2 ♀ Malaya.

(*b*) ♂ darker blue. ♀ unknown.

Sub-sp. ***zylda*** Corbet 1941 : ♂ Sumatra ; type B.M. 5 ♂ Sumatra.

19a (18). Below, markings conspicuous. ♂ above, very dark blue, border ½ mm.

19 (20). Unf discal band broken. ♂ F 21 to 25 mm. ♀ purple, border 3 mm. Fig. Corbet 32 and 36 g.

dajagaka Bethune-Baker 1896 : ♂ Borneo ; type B.M. 33 ♂, 7 ♀ Borneo.

20 (19). Unf discal band unbroken. ♂ 23 mm. Fig. Corbet 38 g.

anamuta Semper 1890 : ♂ Mindanao. 3 ♂ Mindanao. 1 ♂ Mindoro.

21a (1b). Unf lower part of end-cell spot enlarged.

Belphoebe Sub-group

21 (22). Unh no white spot mid space 7. ♂ F 18 mm., rather pale violet blue, border 5 mm. at apex to 2 mm. at dorsum and on H. Below markings conspicuous. Fig. Corbet 35 and 37 g.

belphoebe Doherty 1889 : ♂ Tavoy ; type B.M. 1 ♂ Assam. 1 ♂ Tavoy. 1 ♂ Malaya.

Synonym *cowani* Corbet 1941 : ♂ Malaya ; type B.M. Fig. Corbet 92.

22 (21). Unh with a conspicuous white spot mid space 7. ♂ F 15 mm., shining blue, border 4 mm. at apex to 1½ mm. at dorsum and on H. Below, purple washed ; markings white edged. Fig. Corbet 36 and 41 g.

myrzalina Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂ Malaya.

23a (1a). Unf with spots between cell and costa. ♂ F 22 mm.

Agesias Sub-group

23b (25). Unf with a discal band.

23 (24). Unf spots in spaces 2, 3 elongate.

kinabala Druce 1895 : ♂ Kina Balu. Fig. Bethune-Baker 1903 as "*argesias*"; Corbet 19 as *ovomaculata* and 40 g. as *agesias*. 1 ♀ Malaya. 11 ♂, 3 ♀ Sumatra. 26 ♂, 25 ♀ Borneo. 4 ♂ Pulo Laut.

Synonym *nabala* Corbet 1941 : ♂ Kina Balu ; type B.M.

24 (23). Unf spots in spaces 2, 3, rounded.

agesias Hewitson 1862 : ♂ Borneo ; type B.M. 1 ♀ Malaya. 12 ♂, 5 ♀ Sumatra. 19 ♂, 11 ♀ Borneo. 2 ♂ Pulo Laut. 1 ♀ "Philippines".

Synonym *ovomaculata* Hewitson 1878 : ♂ Sumatra ; type B.M.

25 (23b). Unf no discal band. Fig. Corbet 18 and 39 g.
similis Druce 1895 : ♂ Borneo ; type B.M. 2 ♂ Malaya. 16♂, 17 ♀ Sumatra. 1 ♂ Linga Archipelago. 3 ♂, 3 ♀ Borneo.
Synonym ***anila*** De Nicéville 1896 : ♂ Perak.

C. ABSEUS GROUP OF NARATHURA

1 (2a). Unf no spot in space 12 ; spot in space 4 completely detached from rest of band. ♀ F 26 mm., purple-blue with broad dark borders. ♂ unknown. Fig. Corbet 42.
anella De Nicéville 1895 : ♀ Perak. 2 ♀ Malaya. 2 ♀ Sumatra. 1 ♀ Borneo.

2a (1). Unf costal spot in space 12 as well as 2 spots each in spaces 7, 10, 11. Unh white streak on costa over spot mid space 7.
2 (3). Unf discal spot in space 3 far from end-cell spot. ♂ F 18 mm. Fig. Corbet 83 and 105 g.
abseus. Five sub-species.
(*a*) ♂ shining violet-blue, border 5 mm. at apex to 2 mm. at dorsum ; ♀ pale shining blue.
Sub-sp. ***mackwoodi*** Riley 1923 : ♂ Ceylon ; type B.M. 8 ♂, 7 ♀ Ceylon.
(*b*) ♂ dull purple, border 7 mm. at apex to 4 mm. at dorsum and 5 mm. on H. ♀ blue, borders narrower.
Sub-sp. ***indicus*** Riley 1923 : ♂ Sikkim ; type B.M. 1 ♂ Coorg and 1 ♀ N. Kanara (S. India). 19 ♂, 17 ♀ Sikkim. 9 ♂, 5 ♀ Assam. 34 ♂, 13 ♀ N. Burma to Mergui. 4 ♂, 1 ♀ Siam. 1 ♂, 1 ♀ Cochin China.
(*c*) ♂ brilliant deep purple-blue, border 4 mm. at apex to 2 mm. at dorsum and on H. ♀ pale metallic violet-blue. Flies with *indicus* : underside and genitalia identical.
Sub-sp. ***ophiala*** Corbet 1941 : ♂ Karens ; type B.M. 6 ♂, 2 ♀ Karens. 5 ♂, 9 ♀ Ataran. 5 ♂, 4 ♀ Tavoy. 3 ♂, 4♀ Mergui. 2 ♂, 1 ♀ Victoria Point. 2 ♂ Siam.
(*d*) ♂ dark shining blue, border as *ophiala* ; ♀ pale purple.
Sub-sp. ***abseus*** Hewitson 1862 : ♀ Singapore ; type B.M. 12 ♂, 4 ♀ Malaya. 1 ♂, 1 ♀ Sumatra. 15 ♂, 4 ♀ Borneo. 4 ♂, 2 ♀ Palawan.
Synonym ***nava*** Fruhstorfer 1914 : ♂ Borneo ; type B.M.
(*e*) Only differs from ***abseus*** in ♀ being bluer.
Sub-sp. ***amphea*** Felder 1865 : ♂ Luzon ; type B.M. 6 ♂, 4 ♀ Luzon. 15 ♂, 9 ♀ Mindanao. 10 ♂ Mindoro.
(*f*) ♂ upf border 1 mm., much narrower than in any form.
Sub-sp. ***oghatina*** Fruhstorfer 1914 : ♂ Bazilan ; type B.M. 2 ♂ Bazilan.

3 (2). Unf discal spot in space 3 produced towards the end-cell spot. ♂ F 21 mm. Below, markings larger, more irregular and more sharply defined.
irregularis Bethune-Baker 1903 : ♀ Bangkei ; type B.M. 14 ♂, 9 ♀ Celebes. 3 ♂, 4 ♀ Bangkei.

D. THEBA GROUP OF NARATHURA

1 (2a). Unf no markings above cell. Below markings more or less rounded, resembling *acetes*. ♂ F 24 mm. ; pale shining blue, apex broadly (11 mm.) dark purple, border 1 mm. ♀ pale blue, dark border 6 mm. Fig. Seitz Pl. 150*b*.
theba Hewitson 1862 : ♂ Mindanao ; type B.M. 6 ♂, 1 ♀ Mindanao.

2a (1). Unf long white basal streaks at base costa and base vain 12, followed by 2 white spots in spaces 7, 10, 11. Below, dark brown with conspicuous white stripes, no rounded markings except at base F and H.
2 (3, 4). ♂ F 19 mm., rather pale violet blue with ½ mm. dark border. ♀ bluish-white with dark border F 2 mm. along costa and 4 mm. along termen ; suffused bar end cell and a dark spot beyond. Fig. Seitz Pl. 150*b*.
aronya. Hewitson 1869 : ♀ Mindanao. 1 ♂ Mindanao.

3 (2, 4). ♂ F 23 mm., shining pearly white, with a broad dark, angled apex 5 mm., tapering to 1 mm. at dorsum; between end cell and apex a narrow purple blue area. Fig. Seitz 150 Bc.

argentea Staudinger 1888: ♂ Celebes. 1 ♂ Celebes.

Synonym *clarissa* Grose-Smith 1897: ♂ Celebes.

4 (2, 3). ♂ F 21 mm., very pale pearly blue, with a broad dark triangular apex, inwardly purple, outwardly brown.

sangira Bethune-Baker 1897: ♂ Sangir; type B.M. 1 ♂ Sangir. Fig. Seitz 148*b*.

E HERCULES GROUP OF NARATHURA

1 (2). H cell much < ½ wing. ♂ above shining blue, border a thread: H all space 6 blue. Fig. Seitz 149 g.

hercules. Ten sub-species, some of which fly together.

(*a*) ♂ 35 mm. ♀ dull blue, borders 10 mm.; below green.

Sub-sp. ***hercules*** Hewitson 1862: ♂ Macassar. 12 ♂, 12 ♀ Celebes.

(*b*) ♂ 30 to 33 mm. ♀ brighter purple-blue, border 3 to 5 mm.; below green.

Sub-sp. ***stymphelus*** Fruhstorfer 1914: ♂♀ Batchian: type B.M. 19 ♂, 7 ♀ Halmaheira. 22 ♂ Batchian. 2 ♂ Obi. 1 ♂ Misol.

(*c*) ♂ 29 to 31 mm. ♀ purple-blue, borders 1 to 3 mm. Below, varies from green to white, or pinkish-grey. ♂ brighter blue.

Sub-sp. ***leo*** Druce 1894: ♂♀ Humboldt Bay; type B.M. 11 ♂, 1 ♀ Waigou. 30 ♂, 8 ♀ West New Guinea.

Synonyms *telephus* Toxopeus 1930: ♂ SW. New Guinea.
leonidas Toxopeus 1930: ♂ Salawatti.

(*d*) As *leo*. Below, typically pale greenish-white with narrow markings: sometimes brownish, sometimes white with the markings reduced or obsolete.

Sub-sp. ***droa*** *nov.*: ♂ Aroa River; type B.M. 22 ♂, 20♀ E. New Guinea. 1 ♂, 1 ♀ Sariba Is. 1 ♂ Fergusson Is.

(*e*) Small ♂ F 26 mm.: as *droa*, but below more usually pale green with narrow markings.

Sub-sp. ***louisa*** *nov.*: ♂ Sudest Is.; type B.M. 15 ♂, 4 ♀ Sudest Is. 8 ♂ Rossell Is. 5 ♂, 3 ♀ St. Aignan Is.

(*f*) ♀ brown above, outer half yellowish. ♂ brighter blue than *leo*. Below, pale greenish to pinkish-grey or white: markings liable to much distortion.

Sub-sp. ***herculina*** Staudinger 1888: ♂ Waigou. 4 ♂, 2 ♀ Halmaheira. 35 ♂, 21 ♀ Waigou.

(*g*) Intermediate between ***herculina*** and ***phalaerus***.

Sub-sp. ***leontodamas*** Toxopeus 1930: ♂ Misol. 5 ♂ Gebi. 15 ♂, 2 ♀ Misol.

(*h*) ♀ above plain dark brown. Below dark to pale green.

Sub-sp. ***phalaerus.*** Fruhstorfer 1914: ♂♀ Jobi; type B.M. 10 ♂, 8 ♀ Jobi Is. 14 ♂, 14 ♀ Mioswar Is. 5 ♂, 3 ♀ W. New Guinea.

(*i*) ♀ above and below dark brown.

Sub-sp. ***tyrannus*** Felder 1865: ♂ Halmaheira; type B.M. 25 ♂, 4 ♀ Halmaheira. 2 ♂ Batchian. 1 ♂ "Buru". 1 ♂ "Aroa R."

Synonyms *gilolensis* Felder 1865: ♂ Gilolo; type B.M.
afranius Fruhstorfer 1914: ♂ Aroa River; type B.M.

(*j*) ♀ above, brown: below pale brown.

Sub-sp. ***sophilus*** Fruhstorfer 1914: ♂♀ Obi; type B.M. 20 ♂, 4 ♀ Obi. 3 ♂ Tenimber. 4 ♂, 4 ♀ W. New Guinea.

Synonym *obscurata* Ribbe 1926: ♂ W. New Guinea.

2 (1). H cell = ½ wing. ♂ F 23 mm., dark violet-blue, 1 mm. border. Uph space 6 half brown. ♀ bright shining blue, border 5 mm. Below brown. Fig. Seitz 150 *b*.

ate Hewitson 1863: ♂ Amboina; type B.M. 2 ♂ Amboina. 1 ♂, 1 ♀ Ceram.

F. Democritus Group of Narathura

1a (7a). H tornal lobe conspicuously projecting.

Cleander Sub-group

1 (2a). Unf with spot in space 11. ♂ 23 mm. Fig. Seitz 148*c*.
quercoides Röber 1886 : ♂ Celebes. 32 ♂, 31 ♀ Celebes.

2a (1). Unf no spot in space 11 : generally a spot in space 10.
2 (3a). Unf discal band unbroken, continuous.
cleander. Nine sub-species. Fig. Corbet 45 and 49 g as *aphadantas*.
(*a*) Below pale brown with faint purple wash, markings much darker than ground. ♂ F 23 mm., dark shining blue, border 2 mm.
Sub-sp. ***regia*** Evans 1925 : ♂ Mergui ; type B.M. 5 ♂, 2 ♀ Tavoy. 9 ♂, 7 ♀ Mergui. 3 ♂, 4 ♀ Victoria Point, S. Burma.
(*b*) Below plain brown, markings inconspicuous.
Sub-sp. ***aphadantas*** Corbet 1941 : ♂ Malaya ; type B.M. 2♂, 1 ♀ Malaya.
(*c*) ♂ above, purple-blue, border ½ mm. Below, as (*b*).
Sub-sp. ***incerta*** Moulton 1911 : ♂ Borneo ; type B.M. 1 ♂, 1 ♀ Sumatra. 11 ♂, 9 ♀ Borneo.
(*d*) As *incerta*, but below, conspicuously purple washed.
Sub-sp. ***apharida*** Corbet 1941 : ♂ Lombok ; type B.M. 2 ♂ Java. 1 ♂ Lombok. Fig. in *Rhop. Java* as *apha*.
(*e*) ♂ 25 mm., dark blue, border 1½ mm. ♀ with very reduced purple areas, above, only on half F and at base H.
Sub-sp. ***sostrata*** Fruhstorfer 1914 : ♂ Celebes ; type B.M. 3 ♂, 2 ♀ Celebes. 1 ♂, 1 ♀ Bangkei. 1 ♀ Saleyer.
(*f*) Small, ♂ F 20 mm., very dark blue, border ½ mm. ♀ dark, as *sostrata*.
Sub-sp. ***minor*** *nov.* : ♂ Batchian ; type B.M. 2 ♂, 2 ♀ Batchian.
(*g*) ♂ F 24 mm., dark blue, border 1 mm. ♀ brighter blue with broad borders. Below, ochreous brown, like *sostrata*.
Sub-sp. ***cleander*** Felder 1860 : ♂ Amboina ; type B.M. 10 ♂, 5 ♀ Amboina. 2 ♂, 2 ♀ Buru. 1 ♂, 2 ♀ Ceram.
Synonym *adatha* Hewitson 1862 : ♂ Amboina.
(*h*) ♂ F 22 mm., dark blue, border ½ mm. ♀ brighter blue, border 4 mm. Below, purple. Unh markings faint, discal spot in space 6 nearer to spot in space 5 than to end-cell spot ; dense whitish scaling between tornal markings and the discal band.
Sub-sp. ***aruana*** *nov.* : ♂ Aru ; type B.M. 2 ♂, 1 ♀ Aru.
(*i*) Above, as *aruana* but uph space 7 entirely blue, not half brown as in all other *cleander* forms. Below with purple gloss and conspicuous markings like *aruana*.
Sub-sp. ***jobina*** *nov.* : ♂ Jobi Is. ; type B.M. 2 ♂ Jobi. 1 ♂, 1 ♀ Schouten Is. 1 ♀ Central New Guinea. 1 ♀ British New Guinea. 1 ♀ Mefor Is. 1 ♀ " New Georgia ".

3a (2). Unf discal band broken or sinuous at vein 4.
3 (4a). Unf spot in space 6 very much larger than the spot in space 5. Below, rather pale brown with faint purple gloss and conspicuous markings, irregular and white-edged. ♂ F 23 mm., dark shining blue, border ¾ mm.
nicevillei Bethune-Baker 1903 : ♂ NE. Bengal ; type B.M. 1 ♀ Bhutan, 2 ♂ Jalpaiguri. 2 ♂ E. Manipur. 1 ♀ Bhamo, N. Burma.

4a (3). Unf spots in spaces of 6 and 5 of same size.
4 (5a). Unh discal spot in space 6 with its outer edge in line with the inner edge of the spot in space 5.
athada. Three sub-species.
(*a*) Below, with a conspicuous purple wash. ♂ F 23 mm., dark blue, border 1½ mm. ♀ brighter blue, border 3 mm.

Sub-sp. ***apha*** De Nicéville 1895 : ♂ Martaban, Burma. 1 ♀ Assam. 4 ♂ N. Shan States. 1 ♂ Ataran. 5 ♂ Tavoy. 8 ♂, 1 ♀ Mergui. 4 ♂, 1 ♀ Victoria Point, S. Burma.

(*b*) ♂ upf border ¾ mm. Below, no purple wash.

Sub-sp. ***athada*** Staudinger 1889 : ♀ Malaya : fig. by Distant as *adatha* ; type B.M. 7 ♂, 3 ♀ Malaya. 3 ♂ Sumatra. 1 ♂ Banka. 1 ♂, 1 ♀ Borneo. 4 ♂, 6 ♀ Bawean.

Synonym *agamemnon* Corbet 1941 : ♂ Singapore ; type B.M.

(*c*) ♂ F 22 mm. Below very much darker brown than *athada*, with a faint purple gloss. ♂ upf dark border ¾ mm.

Sub-sp. ***wilemani*** *nov.* : ♂ Mindanao ; type B.M. 5 ♂ Mindanao.

5a (4). Unh discal spot in space 6 not reaching the inner edge of the spot in space 5.

5 (6). Unh discal spot in space 6 outwardly concave or straight. Fig. Corbet 43 (as *adorea*) and 47 g.

silhetensis. Four sub-species.

(*a*) ♂ F 25 mm., bright shining blue, border 1 mm. ♀ lighter blue, border 4 mm. Below somewhat ochreous brown, no purple wash.

Sub-sp. ***silhetensis*** Hewitson 1862 : ♂ Sylhet ; type B.M. 1 ♂ Sikkim. 1 ♀ Cachar. 2 ♂ Sylhet. 16 ♂, 8 ♀ Manipur and Naga Hills. 1 ♂ Bhamo. 4 ♂, 6 ♀ N. Shan States. 2 ♂, 2 ♀ Karens. 8 ♂, 8 ♀ Ataran. 4 ♂, 2 ♀ Tavoy. 5 ♂, 3 ♀ Mergui. 2 ♂ Victoria Point. 1 ♀ Siam. 1 ♀ Cochin China. 1 ♂, 1 ♀ Peninsular Siam.

Synonym *arama* De Nicéville 1895 : ♂ Sikkim.

(*b*) Below, browner. ♂ upf border ½ mm.

Sub-sp. ***adorea*** De Nicéville 1890 : ♂ Singapore ; type B.M. 3 ♂, 2 ♀ Malaya. 3 ♂ Sumatra. 10 ♂, 6 ♀ Borneo.

Synonym *drucei* Bethune-Baker 1896 : ♂ Borneo.

(*c*) ♂ F 22 mm., border ¾ mm. Below, markings wide apart as in *silhetensis*, not close together as in *adorea*.

Sub-sp. ***fundania*** Fruhstorfer 1914 : ♂ Java ; type B.M. 14 ♂, 12 ♀ Java. Fig. *Rhop Java* as *vihara*.

(*d*) Like *fundania*, with narrow markings. Larger ♂ F 25 mm., border very narrow, ½ mm.

Sub-sp. ***malayica*** Bethune-Baker 1903 : ♂ Philippines ; type B.M. 4 ♂ Mindanao. 7 ♂ Mindoro.

6 (5). Unh discal spot in space 6 outwardly convex, set obliquely against end-cell spot and directed to apex H.

zambra. Two sub-species. Fig. Corbet 44 and 48 g.

(*a*) ♂ F 22 mm., border ½ mm. Below somewhat ochreous brown, markings well defined.

Sub-sp. ***zambra*** Swinhoe 1910 : ♂ Ataran ; type B.M. 9 ♂, 3 ♀ Karens. 11 ♂, 7 ♀ Ataran. 2 ♂ Tavoy. 16 ♂, 11 ♀ Mergui. 4 ♂, 3 ♀ Victoria Point. 2 ♂ Siam. 8 ♂, 4 ♀ Malaya. 7 ♂, 6 ♀ Sumatra. 1 ♂ Nias. 11 ♂, 3 ♀ Borneo. 1 ♀ Bawean. 1 ♂ Banka. 4 ♂, 7 ♀ Java.

Synonyms *antura* Swinhoe 1910 : ♂ Ataran ; type B.M.

georgias Piepers & Snellen 1918 : ♂ Java : figured as *adorea*.

vandenberghi Corbet 1941 : ♂ Java, citing Toxopeus as author.

(*b*) Larger, ♂ F 24 mm. Below, much darker.

Sub-sp. ***plateni*** *nov.* : ♂ Mindanao ; type B.M. 2 ♂, 2 ♀ Mindanao.

7a (1a). H tornal lobe not conspicuously projecting.

7b (20a). Unf discal spot in space 4 not or not much out of line with those in spaces 5 and 6 ; unf. no spot mid space 11.

Atrax Sub-group

7c (16a). Unh discal spot in space 6 about equal to the gap between the end-cell spot and the spot in space 5.

7d (9a). Unh central cell spot elongate, across cell.

7 (8). Unf discal band broken at vein 4.

ace. Two sub-species. Fig. Corbet 46 and 50 g.

(*a*) Small ♂ F 20 mm., border broader ¾ mm.

Sub-sp. ***arata*** Tytler 1915: ♂ Manipur; type B.M. 4 ♂ Manipur. 1 ♂ Ruby Mines, N. Burma. 2 ♂ Ataran.

(*b*) ♂ F 22 mm., dark blue, border a thread. ♀ purple with broad borders.

Sub-sp. ***ace*** De Nicéville 1892: ♂ Perak. 2 ♂, 1 ♀ Sumatra. 3 ♂, 2 ♀ Borneo.

8 (7). Unf discal band unbroken.

azinis. Two sub-species. Fig. Corbet 50.

(*a*) ♂ F 18 mm., dark blue, border 1¼ mm. F and 3 mm. H.

Sub-sp. ***azinis*** De Nicéville 1896: ♂ Sumatra; type B.M. 3 ♂, 1 ♀ Sumatra. 2 ♀ Java.

(*b*) ♂ F 20 mm., bluer, border ½ mm. (see Appendix 3).

Sub-sp. ***kounga*** Bethune-Baker 1896: ♀ Kina Balu. 2 ♂, 2 ♀ Borneo.

9a (7d). Unh central cell spot circular.

9 (10a). Unf discal spot in space 9 absent or very faint.

agrata. Three sub-species. Fig. Corbet 47 and 51 g.

(*a*) Apex more pointed, termen straighter. ♂ above, paler and bluer: ♀ much bluer and more shining.

Sub-sp. ***binghami*** Corbet 1946: ♂ Yé Valley; type B.M. 6 ♂, 10 ♀ Manipur. 1 ♂, 1 ♀ N. Shan States. 1 ♀ Karens. 8 ♂, 9 ♀ Ataran. 1 ♂ Tavoy. 6 ♂ Mergui. 3 ♂, 3 ♀ Victoria Point. 2 ♂, 5 ♀ Peninsular Siam.

(*b*) ♂ F 19 mm., very dark blue, border ½ mm. Below, markings not darker than ground, inconspicuous.

Sub-sp. ***agrata*** De Nicéville 1890: ♂ Singapore. 17 ♂, 6 ♀ Malaya. 11 ♂, 1 ♀ Sumatra. 1 ♂, 1 ♀ Nias. 2 ♂ Java.

(*c*) ♂ as *agrata*; ♀ purple instead of blue.

Sub-sp. ***brookei*** Bethune-Baker 1903: ♂ Pulo Laut; type B.M. 9 ♂, 4 ♀ Borneo. 1 ♂ "Hong Kong". 1 ♂ "New Guinea".

10a (9). Unf discal spot in space 9 conspicuous.

10 (11a). Below, glazed pale purple. ♂ F 20 mm., blue, border 1 mm. Wings more pointed.

aurelia Evans 1925: ♂ Manipur; type B.M. 25 ♂, 5 ♀ Manipur. 1 ♂ Upper Chindwin. 3 ♂, 1 ♀ Karens. 5 ♂, 7 ♀ Ataran. 1 ♂ Tavoy. 1 ♂ Victoria Point. 3 ♂ Siam.

11a (10). Below brown.

11 (12a). ♂ upf border broad, > 1 mm. Below, often washed pinkish-purple. Wings rounded.

selta. Two sub-species. Fig. Corbet as *alea* 53 and 59 g.

(*a*) ♂ F 17 mm., border 1¼ mm.

Sub-sp. ***selta*** Hewitson 1869: ♀ Moulmein; type B.M. 13 ♂, 6 ♀ Karens. 16 ♂, 4 ♀ Ataran. 36 ♂, 7 ♀ Tavoy. 17 ♂, 8 ♀ Mergui. 8 ♂, 3 ♀ Victoria Point. 1 ♂, 1 ♀ Peninsular Siam. 1 ♂ Malaya. 1 ♂ "Sumatra".

(*b*) ♂ F 20 mm., border 2 mm. Below, dark brown, markings darker than ground: no tornal metallic scaling.

Sub-sp. ***constanceae*** De Nicéville 1894: ♀ S. Andaman Is. 6 ♂, 1 ♀ S. Andaman Is.

12a (11). ♂ upf border narrow, < 1 mm.

12 (13a). ♂ above, clear blue, no admixture of purple, border ½ mm.: uph space 6 mostly blue. Unf discal band generally sinuous, due to spot in space 3 being shifted inwards.

ralanda. Four sub-species. Fig. Corbet 48 and 53 g as *ridleyi*.

(*a*) Typical form (see Appendix 3, re *kounga*).

Sub-sp. ***ralanda*** Corbet 1941 : ♂ Tavoy ; type B.M. 1 ♂ " Assam ". 29 ♂, 11 ♀ Karens. 27 ♂, 6 ♀ Ataran. 17 ♂, 6 ♀ Tavoy. 10 ♂, 3 ♀ Mergui. 1 ♀ Siam.

(*b*) ♂ upf border broader. ♀ duller, more purple, borders broader.

Sub-sp. ***ridleyi*** Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂ Langkawi Is. 54 ♂, 1 ♀ Malaya. 5 ♂, 6 ♀ Sumatra. 1 ♀ Natuna. 6 ♂, 5 ♀ Borneo.

Synonym *milleri* Corbet 1941 : ♂ Langkawi Is. ; type B.M.

(*c*) ♂ above, faint, but perceptible, indigo hue.

Sub-sp. ***karnyi*** Corbet 1941 : ♂ Mentawi Is. ; type B.M. 3 ♂, 1 ♀ Mentawi Is.

(*d*) Below, with a purple wash, recalling *selta*.

Sub-sp. ***molta*** *nov.* : ♂ Java ; type B.M. 4 ♂ Java.

13a (12). ♂ above, purple blue.

13 (14a). Unh discal spot in space 6 is an elongate oval over the end-cell spot and is remote from the discal spot in space 5. ♂ uph space 6 mostly or all blue.

aroa. Two sub-species. Fig. Corbet 49 and 55 g.

(*a*) Shining purple with narrow dark borders uniform : ♀ dark borders narrower.

Sub-sp. ***esava*** Corbet 1941 : ♂ Mergui ; type B.M. 3 ♂, 1 ♀ Ataran. 26 ♂, 17 ♀ Mergui. 4 ♂, 4 ♀ Victoria Point. 1 ♂ Peninsular Siam.

(*b*) Darker, ♂ F 21 mm., border ½ mm.

Sub-sp. ***aroa*** Hewitson 1863 : ♂ Sumatra ; type B.M. 3 ♂, 2 ♀ Malaya. 10 ♂, 1 ♀ Sumatra. 12 ♂, 1 ♀ Borneo. 1 ♂ " Java ". 4 ♂, 1 ♀ " Bazilan ".

Synonyms *pryeri* Butler 1892 : ♂ Borneo ; type B.M.

arops Corbet 1941 : ♂ Malaya ; type B.M.

14a (13). Unh spot in space 6 more or less quadrate, between end-cell spot and spot in space 5.

14 (15). ♂ uph space 6 mostly blue.

sublustris. Two sub-species.

(*a*) ♂ F 19 mm., dark purple blue, border ½ mm.

Sub-sp. ***phanda*** Corbet 1941 : ♂ Malaya ; type B.M. 18 ♂, 13 ♀ Malaya.

(*b*) ♂ darker.

Sub-sp. ***sublustris*** Bethune-Baker 1904 : ♀ Kina Balu ; type B.M. 4 ♂, 1 ♀ Sumatra. 4 ♂, 2 ♀ Borneo.

15 (14). ♂ uph space 6 mostly brown.

phaenops. Six sub-species. Fig. Corbet 51 and 56 g.

(*a*) Described as form of *azinis*, from a discolored specimen, marked as in *phaenops*. Fig. Corbet 57 g.

Sub-sp. ***evansi*** Corbet 1941: ♂ Malaya ; type B.M. and 1 ♂ Renong.

(*b*) ♂ F 19 mm., dark purple-blue, border 1¼ mm. at apex to ½ mm. at dorsum F. Below, ochreous-brown with darker markings.

Sub-sp. ***sandakani*** Bethune-Baker 1896 : ♂ Borneo ; type B.M. 1 ♂ Sumatra. 13 ♂, 2 ♀ Borneo.

(*c*) Smaller and with a broader dark border.

Sub-sp. ***detrita*** Staudinger 1889 : ♂ Palawan. None in B.M.

(*d*) ♂ F 18 mm., border 2 mm. at apex to 1 mm. at dorsum F.

Sub-sp. ***phaenops*** Felder 1865 : ♂ Luzon ; type B.M. 4 ♂ Luzon. 7 ♂, 2 ♀ Mindanao. 10 ♂, 2 ♀ Mindoro. 11 ♂, 1 ♀ Philippines. 1 ♂ Sangir. 1 ♂ Talaut. 2 ♂, 1 ♀ Batchian.

(*e*) ♂ border F narrower. Below redder brown.

Sub-sp. ***termerion*** Fruhstorfer 1914 : ♂ Bazilan ; type B.M. Only the type in B.M.

(*f*) ♂ F 17 mm., dark purple-blue, border narrower. Unh outer third free from maculation, except for the tornal metallic spots.

Sub-sp. ***buruensis*** Holland 1900 : ♂ Buru. 1 ♂ Obi. 3 ♂ Buru.

16a (7c). Unh discal spot in space 6 not nearly equal to the gap between the end-cell spot and the discal spot in space 5.

16b (18a). Unh discal spot in space 6 not overlapping the spot in space 5.

16 (17). Unh purple washed. ♂ 20 mm., purple-blue, border 1 mm. F, 2 mm. H. Name formerly wrongly used for *selta*.

alea Hewitson 1862 : ♂ India. 3 ♂, 1 ♀ Mysore. 2 ♂, 2 ♀ Coorg. 1 ♂, 1♀ Nilgiris. 36 ♂, 22 ♀ N. Kanara.

Synonym ***canaraica*** Moore 1884 : ♂ N. Kanara ; type B.M.

17 (16). Unh plain brown. There seem to be 2 forms flying together with identical and very peculiar genitalia (see Corbet 52 g). Not seasonal forms ; possibly ecological sub-species.

oenea. Two sub-species.

(*a*) ♂ F 19 mm., bright dark blue, border 1 mm. to a thread : uph space 6 half brown. Below, light brown, markings faint : no tornal metallic scaling.

Sub-sp. ***oenea*** Hewitson 1869 : ♂ Sikkim ; type B.M. 1 ♀ Mussoorie. 17 ♂, 15 ♀ Sikkim. 12 ♂, 14 ♀ Assam. 1 ♂ N. Burma. 2 ♂, 3 ♀ N. Shan States.

(*b*) ♂ F 22 mm., very dark blue, border a thread : uph space 6 mostly blue. Below, as *oenea* but unh with a black tornal lobe and a more or less black spot alongside it crowned with metallic scales.

Sub-sp. ***khamti*** Doherty 1891 : ♂ Assam ; type B.M. 4 ♂, 4 ♀ Sikkim. 6 ♂, 4 ♀ Assam. 1 ♂ Chittagong. 2 ♂, 3 ♀ Hainan.

18a (16b). Unh discal spot in space 6 overlaps spot in space 5.

18 (19). Upf ♂♀ no conspicuous dark spot at end of cell. ♂ F 18 mm. dull purple-blue, border 3 mm. F : on H, blue not extending beyond end cell. ♀ lighter blue. Below, grey brown, with a slight purple wash (see Appendix 4 for name).

atrax Hewitson 1867 : ♀ Bengal ; type B.M. 1 ♂ Niligiris. 8 ♂, 6 ♀ Poona. 5 ♂, 5 ♀ Pachmarhi. 6 ♂, 6 ♀ Orissa. 4 ♂, 4 ♀ Bengal. 3 ♂, 3 ♀ Murree. 5 ♂, 5 ♀ Mussoorie. 1 ♂ Simla. 3 ♂, 3 ♀ Kumaon. 3 ♂, 3 ♀ Nepal. 8 ♂, 8 ♀ Sikkim. 1 ♂, 1 ♀ Assam. 24 ♂, 34 ♀ Burma to Ataran.

Synonyms ***alemon*** De Nicéville 1891 : ♂ Burma.
hewitsoni Bethune-Baker 1903 : ♂ India ; type B.M.

19 (18). ♂♀ upf with a conspicuous dark spot at end of cell. ♂ F 20 mm., purple-blue, border 3 mm. : uph blue area to just beyond end cell. ♀ bluer. Unh no green scaling. Fig. Corbet 62 g.

alax Evans 1932 : ♂ Manipur ; type B.M. 17 ♂, 18 ♀ Manipur. 12 ♂, 4 ♀ N. Burma. 9 ♂, 10 ♀ N. Shan States. 6 ♂, 8 ♀ S. Shan States. 1 ♂, 1 ♀ Karens. 2 ♂, 12 ♀ Ataran. 3 ♂, 1 ♀ W. Siam.

20a (7b). Unf discal spot in space 4 shifted outwards out of line with the spots in spaces 5 and 6 ; unf. a spot present mid space 11.

Democritus Sub-group

20 (21a). Unh outer edge of discal spot in space 6 concave.

democritus. Four sub-species. Fig. Corbet 37 and 42 g.

(*a*) ♂ F 18 mm., pale metallic silvery blue, shading to violet at apex F, border ½ mm. Below dark chocolate with white dots and dashes.

Sub-sp. ***democritus*** Fabricius 1793 : ♂ E. Indies. 10 ♂, 11 ♀ Karens. 10 ♂, 1 ♀ Ataran. 8 ♂, 9 ♀ Tavoy. 7 ♂, 7 ♀ Mergui. 8 ♂, 8 ♀ Victoria Point. 1 ♂ Indo-China. 2 ♂, 1 ♀ Siam. 6 ♂, 6 ♀ Peninsular Siam. 3 ♂, 3 ♀ Langkawi Is. 4 ♂, 1 ♀ Malaya (N. Kedah, Perlis, Wellesley). 1 ♂ " Sumatra ". 1 ♂ " Java ".

Synonym ***albopunctata*** Hewitson 1869 : ♂ Moulmein ; type B.M.

(*b*) Below, duller with inconspicuous markings of the usual type. Above, ♂ nearly as bright as *democritus* : ♀ more purple-blue, with narrow borders, ½ mm. on uph. ♂ F 19 mm.

Sub-sp. ***lycaenaria*** Felder 1860 : ♂ Malacca ; type B.M. 1 ♂ "Naga Hills". 7 ♂, 8♀ Perak. 5 ♂, 5 ♀ Pahang. 6 ♂ Malacca. 1 ♂, 1 ♀ Taiping. 12 ♂, 6 ♀ Singapore.

(*c*) Larger, ♂ F 20 mm. Intermediate to *olinda.*

Sub-sp. ***buxtoni*** Hewitson 1878 : ♀ Sumatra : type B.M. 12 ♂, 10 ♀ Sumatra.

(*d*) ♂ more uniform : ♀ purple with much broader borders, 3mm. on H, and upf with a dark spot at end of cell.

Sub-sp. ***olinda*** Druce 1873 : ♂ Borneo ; type B.M. 13 ♂, 17 ♀ Borneo.

21a (20). Unh outer edge of discal spot in space 6 convex or straight.

21b (25a). Unf with a spot at base of space 10 : rarely absent on one side.

21c (23a). Below, markings conspicuously darker than the ground.

21 (22). Unh grey-brown.

alitaeus. Six sub-species. Fig. Corbet 38 and 43 g.

(*a*) ♂ F 19 mm., bright blue, border 1 mm. : uph space 6 half blue. Below brown with more or less of a purple wash, markings irregular, as in in *alitaeus*.

Sub-sp. ***mirabella*** Doherty 1889 : ♀ Mergui ; type B.M. 1 ♂ Karens. 9 ♂, 7 ♀ Ataran. 8 ♂, 10 ♀ Tavoy. 9 ♂, 8 ♀ Mergui. 7 ♂, 9 ♀ Victoria Point. 5 ♂ Siam. 3 ♂ Langkawi Is.

Synonym *valika* Corbet 1941 : ♂ Langkawi Is. ; type B.M.

(*b*) ♂ upf border narrower, ¾ mm.

Sub-sp. ***pardenas*** Corbet 1941 : ♂ Singapore ; type B.M. 3 ♂, 3 ♀ Malaya.

(*c*) ♂ duller, purple blue, border ¾ to ½ mm. Below, markings rather less conspicuous.

Sub-sp. ***mira*** Corbet 1941 : ♂ Borneo ; type B.M. 5 ♂, 4 ♀ Borneo. 2 ♂ Mentawi Is.

Synonym *psama* Corbet 1941 : ♂ Mentawi Is. ; type B.M.

(*d*) ♂ F 20 mm., border a thread. Below, with a slatey glaze and a more uniform appearance.

Sub-sp. ***myrtale*** Staudinger 1889 : ♂ Palawan. 5 ♂ Palawan.

(*e*) Unh more or less whitened, presenting an appearance quite different from ***myrtale***.

Sub-sp. ***panta*** *nov.* : ♂ Mindanao ; type B.M. 5 ♂ Mindanao. 1 ♂ Luzon.

(*f*) ♂ F 20 mm., dark blue, border 1 mm. ♀ very different, all brown except for some dull purple on basal half upf.

Sub-sp. ***alitaeus*** Hewitson 1862 : ♂ Makassar ; type B.M. 19 ♂, 19 ♀ Celebes.

Synonym *viviana* Röber 1887 : ♂ Bangkei.

22 (21). Unh dark brown with a purple wash. ♂ F 20 mm., dark blue, border ½ mm. ♀ purple-blue, border 3 mm. : uph all brown. Genitalia differ considerably.

sintanga Corbet 1948 : ♂ Borneo ; type B.M. 2 ♂, 2 ♀ Borneo.

23a (21c). Below, markings not darker than ground.

23 (24). ♂ above, dark blue with a dark border.

mindanensis. Four sub-species.

(*a*) ♂ F 20 mm., blue, border 1 mm. ♀ brighter blue, border 4 mm. Below, markings outlined brownish-white.

Sub-sp. ***epibata*** Corbet 1948 : ♂ Singapore ; type B.M. 14 ♂, 2 ♀ Malaya.

(*b*) Smaller, ♂ F 19 mm., more purple-blue : ♀ purple.

Sub-sp. ***contra*** *nov.* : ♂ Borneo ; type B.M. 2 ♂, 1 ♀ Sumatra. 11 ♂, 5 ♀ Borneo.

(*c*) F less produced : below rather like ***myrtale*** : ♀ very dark, upf basal third dull purple, uph all brown.

Sub-sp. ***mindanensis*** Bethune-Baker 1903 : ♂ Mindanao ; type B.M. 9 ♂, 4 ♀ Mindanao.

(*d*) As ***mindanensis***, but unh whitened.

Sub-sp. ***zilensis*** Fruhstorfer 1914 : ♂ Bazilan ; type B.M. 1 ♂ Bazilan.

24 (23). ♂ above, bright shining blue, border a thread : uph space 6 all blue : F 19 mm. ♀ purple blue, border 2 to 3 mm., dark spot about end of cell upf. Below rather pale brown, markings as in *alitaeus*. Uncus hooks not expanded at their ends.

***denta** nov.* : ♂ Mt. Marapok, Dent Province, Borneo ; type B.M. 14 ♂, 5 ♀ Borneo. Fig. Corbet 46 g as *elopura*.

25a (21b). Unf no spot at base of space 10.

25 (26a). Unf spots in spaces 4 to 7 almost in line.

aida. Two sub-species. Fig. Corbet 44 g (see Appendix 4).

(*a*) ♂ F 18 mm., dark shining blue, border 1½ mm. Uph one-third of space 6 blue. Below grey-brown.

Sub-sp. ***aida*** De Nicéville 1889 : ♂ Pegu Yoma, Burma. 7 ♂, 2 ♀ S. Shan States. 3 ♂ Ataran. 12 ♂, 10 ♀ Tavoy. 9 ♂, 6 ♀ Mergui. 2 ♂, 2 ♀ Victoria Point. 3 ♂, 2 ♀ Siam. 1 ♂, 2 ♀ Indo-China. 26 ♂, 12 ♀ Hainan. 2 ♂, 3 ♀ Peninsular Siam. 3 ♂, 3 ♀ Langkawi Is. 1 ♂ E. Indies (Hewitson's ***atrax*** ♂).

(*b*) ♂ F 16 mm., bright shining blue, border 1 mm. : uph half of space 6 blue. Below, with distinct purple gloss. Fig. Corbet 39 as ***atrax***.

Sub-sp. ***ophir** nov.* : ♂ Mt. Ophir, Malaya ; type B.M. Only the type.

26a (25). Unf spots in spaces 4 to 7 irregular, those in spaces 4 and 7 out of line.

26 (27a). ♂ upf border broad, 3 mm. : F 18 mm. Uph ¾ of space 6 brown. Below grey-brown.

myrtha Staudinger 1889 : ♂ Palawan. 3 ♂ Palawan.

27a (26). ♂ upf border not > 1 mm.

27 (28). Below brown, markings not darker than the ground.

pseudomuta. Four sub-species. Fig. Corbet 40 and 45 g as *arianaga*.

(*a*) ♂ F 20 mm., bright shining blue, border ¾ mm.

Sub-sp. ***ariana*** Evans 1925 : ♂ Tavoy ; type B.M. 3 ♂, 2 ♀ Ataran. 9 ♂, 6 ♀ Tavoy. 5 ♂, 2 ♀ Mergui. 2 ♂, 2 ♀ Victoria Point.

(*b*) Darker shining blue, border 1 mm. Flies with ***ariana***.

Sub-sp. ***dama*** Swinhoe 1910 : ♂ Mergui ; type B.M. 2 ♂, 3 ♀ Ataran. 2 ♂, 3 ♀ Tavoy. 23 ♂, 25 ♀ Mergui. 8 ♂, 3 ♀ Victoria Point. 1 ♂, 1 ♀ Siam. 1 ♂ Annam. 1 ♂, 1 ♀ Peninsular Siam. 1 ♂ Langkawi Is.

Synonym *ariavana* Corbet 1941 : ♂ Langkawi Is. : type B.M.

(*c*) ♂ F 20 mm., dark blue, border ½ mm. : uph more than half of space 6 is blue (see Appendix 5 for name).

Sub-sp. ***pseudomuta*** Staudinger 1889 : ♂ Malaya. 29 ♂, 13 ♀ Malaya.

Synonyms *rafflesii* De Nicéville 1890 : ♂ Singapore ; type B.M. Fig. Corbet 41.
arianaga Corbet 1941 : ♂ Malaya ; type B.M.

(*d*) ♂ 18 mm., wings more rounded, border a thread.

Sub-sp. ***elopura*** Druce 1894 : ♂ Borneo ; type B.M. 3 ♂, 1 ♀ Sumatra. 4 ♂, 13 ♀ Borneo. 1 ♀ " Lombok ".

28 (27). Below, purple washed : markings darker than the ground.

havilandi. Two sub-species.

(*a*) Smaller, ♂ F 18 mm., brighter blue, border a thread. ♀ blue.

Sub-sp. ***kota** nov.* : ♂ Kota Tinggi, Johore, 1st May 1938 : J. N. Eliot ; type B.M. 2 ♂, 2 ♀ Malaya.

(*b*) ♂ F 22 mm., border ½ mm. Uph nearly all space 6 blue.

Sub-sp. ***havilandi*** Bethune-Baker 1896 : ♂ Borneo. 3 ♂, 4 ♀ Borneo.

G. EUMOLPHUS GROUP OF NARATHURA

1 (2a). H tornal lobe conspicuously projecting.

Nobilis Sub-group

nobilis. Four sub-species. Fig. Seitz 149*f*.

(*a*) ♂ F 27 mm., dark shining blue border ½ mm. ♀ dull purple with very broad borders. Below, uniform brown. Unf costal spots in spaces 7, 10, 11 : discal spots in spaces 4, 5 out of line, elongate, nearly reaching termen.

Sub-sp. ***alce*** Hewitson 1862 : ♂ " Aru " (probably Halmaheira) ; type B.M. 1 ♀ " Celebes ". 7 ♂, 1 ♀ Halmaheira. 2 ♂ Aru.

Synonym *ajusa* Fruhstorfer 1913 : ♂ Halmaheira ; type B.M.

(*b*) Similar, but ♀ blue with narrow dark border. Below, less strongly marked. ♂ brighter blue.

Sub-sp. ***nobilis*** Felder 1860 : ♂ Amboina ; type B.M. 1 ♂ Obi. 1 ♂ Amboina. 2 ♂, 1 ♀ Ceram. 1 ♀ Key Is.

Synonym *nobilior* Fruhstorfer 1913 : ♂ Obi ; type B.M.

(*c*) ♂ F 25 mm. Unh variegated, much paler and markings fainter below a dark costal area obscuring the spots.

Sub-sp. ***alcestis*** Grose Smith 1902 : ♂ Milne Bay ; type B.M. 1 ♀ "Batchian". 1 ♂ Gebi. 1 ♂ Aru. 8 ♂, 3 ♀ W. New Guinea. 2 ♂ British New Guinea.

Synonyms *athara* Grose-Smith 1902 : ♂ Stephansort ; type B.M. A variety with a darker underside.

caelestis Röber 1931 : ♂ SW. New Guinea.

(*d*) F ♀ 20 mm. Above, as *alcestis*. Below plain brown with faint markings.

Sub-sp. ***bosnikiana*** Joicey & Talbot 1916 : ♀ Schouten Is. ; type B.M., and 1 ♀ Mefor Is., Geelvink Bay.

2a (1) H tornal lobe not conspicuously projecting.

2b (8a). Below, markings macular, not banded.

Wildei Sub-group

2 (3a). Unf with a costal spot in space 10. ♂ F 26 mm.

antharita. Two sub-species.

(*a*) ♂ very dark blue, border 7 to 8 mm. : uph only blue in cell. ♀ bright purple blue, border 3 mm. Below, ♂ light brown, ♀ nearly white : unh costal markings enlarged and conjoined.

Sub-sp. ***hyacinthus*** Röber 1931 : ♂ SW. New Guinea : figured. 1 ♂, 7 ♀ W. New Guinea (Eilanden and Oetakwa Rivers).

(*b*) ♂ above, entirely dark brown, with some obscure blue scaling about end cell F.

Sub-sp. ***antharita*** Grose-Smith 1894 : ♂ Humboldt Bay ; type B.M. : figured *Rhop. Exot.* 1878. Only the type.

3a (2). Unf no costal spot in space 10.

3b (5a). Unf discal spots in spaces 6, 5, 4 directed to mid-termen.

3 (4). Below white with small brown markings.

wildei. Three sub-species. Fig. Seitz 147 *g*.

(*a*) ♂ F 21 mm., light blue, border 2 to 3 mm., dark spot end cell F. ♀ white with dark borders 5 mm. and blue bases.

Sub-sp. ***wildei*** Miskin 1891 : ♂ Cairns. 36 ♂, 11 ♀ Queensland.

Synonym *cupido* Bethune-Baker 1903 : cited as a synonym.

(*b*) ♀ uph white area reduced, entire costa and apex dark brown. Smaller.

Sub-sp. ***soda*** *nov.* : ♀ Sudest Is. ; type B.M. 1 ♂, 2 ♀ Sudest Is. 1 ♂, 1 ♀ Woodlark Is.

(*c*) ♀ F 23 mm., no blue colouring at bases F and H, or dark spot at end of cell upf in ♂ or ♀.

Sub-sp. ***neva*** *nov.* : ♀ Stephansort ; type B.M. Type and 1 ♂ W. New Guinea (Ninay Valley).

4 (3). Below brown with conspicuously white ringed large markings : unh discal spots in spaces 6, 7 united to a single large round spot. ♂ F 23 mm., light purple-blue, border 2 to 3 mm., as in *wildei*.

halma *nov.* : ♂ Halmaheira ; type B.M. 2 ♂ type locality.

5a (3b). Unf discal spots in spaces 6, 5, 4 directed to tornus.

5 (6a). Unf discal spots in spaces 2, 3 much smaller than those in spaces 4 to 6. ♂ F 17 mm., dull pale blue, border 2½ mm., dark spot end cell F . ♀ inner half of disc dull light blue, outer half white : dark border 6 to 4 mm., dark spot end cell : uph similar, pale area more restricted. Below, light grey, markings white-edged.

asma *nov.* : ♂ Woodlark Is. ; type B.M. 1 ♂, 1 ♀ Woodlark Is.

6a (5). Unf discal spots in spaces 2, 3 not smaller than those in spaces 4 to 6.

6 (7). Unf discal spot in space 1b absent or faint.

irma. Two sub-species.

(*a*) ♂ F 22 mm., shining light blue, border 2 to 1 mm., veins narrowly black. Below light brown, markings faint.

Sub-sp. ***irma*** Fruhstorfer 1914 : ♂ Obi ; type B.M., unique.

(*b*) Light purple-blue, veins not black. ♀ shining light blue, border 6 to 2 mm. Below, violet brown, markings clear.

Sub-sp. ***purpura*** *nov.* : ♂ Oetakwa River, W. New Guinea ; type B.M. 1 ♂ (type) : 1 ♀ Ron Is. (W. Doherty, 1897).

7 (6). Unf discal spot in space 1b conspicuous. ♂ F 26 mm., shining light blue, border 2½ to 1 mm. on F and ½ mm. on H. ♀ light blue, border 7 mm. Below, dark brown, white-edged darker markings.

halmaheira Bethune-Baker 1904 : ♂ Halmaheira : type B.M. 4♂, 2 ♀ Halmaheira.

8a (2b). Below, markings banded.

8b (11a). Below, markings not darker than ground.

Acetes Sub-group

8 (9a). Unh in space 7 central spot not nearer to the basal than to the discal spot. ♂ F 22 to 30 mm., dark blue, border a thread. ♀ purple-blue on basal third F and in cell H. Fig. Seitz 149*d* and 150*a* and *b*.

acetes Hewitson 1862 : ♀ Macassar ; type B.M. 31 ♂, 19 ♀ Celebes. 2 ♂ Bangkai. 1 ♂ Talaut. 1 ♂ Toeken Besi.

Synonym ***kitjila*** Ribbe 1926 : W. Celebes.

9a (8). Unh in space 7 central spot much nearer to the basal than to the discal spot.

9 (10). Unf and unh lower part of end-cell spot expanded outwards.

tephlis. Two sub-species. Fig. Seitz 149 *e* (poorly).

(*a*) Unh more or less whitened beyond the discal band and above the cell : in one ♂ unf is also whitened. ♂ F 23 mm., purple-blue, border 2½ to 1½ mm. : ♀ blue, border 8 mm.

Sub-sp. ***bicolora*** Röber 1886 : ♀ S. Celebes. 23 ♂, 15 ♀ Celebes.

(*b*) Unh a white streak from base to termen over cell and vein 6. ♂ upf dark border narrow, 1½ to ½ mm.

Sub-sp. ***tephlis*** Hewitson 1869 : ♂ Gilolo ; type B.M. Unique.

10 (7). Unf and with unh lower part of end-cell spot not expanded outwards.

bazaloides. Two sub-species. Fig. Corbet 80 g. Seitz 148*a*.

(*a*) ♂ upf dark border 1 mm. : uph half of space 6 blue.

Sub-sp. ***lanka*** *nov.* : ♂ Ceylon ; type B.M. Unique.

(*b*) ♂ F 21 mm., dark purple-blue, border 2 mm. : uph space 6 mostly brown. ♀ lighter purple-blue, border 4 mm. Unh very variable, purple-brown, more or less white scaled : tornal metallic scaling vestigial.

Sub-sp. ***bazaloides*** Hewitson 1878 : ♀ ? loc. ; type B.M. 1 ♂ Travancore. 1 ♀ Mysore. 4 ♂, 4 ♀ Coorg. 15 ♂, 16 ♀ N. Kanara, S. India. 15 ♂, 10 ♀ Assam. 1 ♀ Renong, Siam. 2 ♀ Hainan. (Langkawi Is., Corbet).

11a (8b). Below, markings darker than the ground.

Eumolphus Sub-group

11b (20a). Unh discal spot in space 6 outwardly concave.

11 (12a). Unf dark area under cell extends to the discal band. H cell $< \frac{1}{2}$ wing.

amantes. Three sub-species. Fig. Seitz 147*f*. Corbet 83 g. Fig. of *amantes* in *Rhop. Java* is *araxes onetor* Fruh.

(*a*) ♂ F 27 mm., shining blue, border ½ mm. ♀ lighter, borders very broad. Below, grey-brown, paler apically on F and H.

Sub-sp. ***amantes*** Hewitson 1862 : ♂ Ceylon ; type B.M. 15 ♂, 15 ♀ Ceylon. 8 ♂, 4 ♀ S. India. 13 ♂, 13 ♀ N. Kanara. 6 ♂, 6 ♀ Poona.

(*b*) ♂ upf border broader, 4 mm. at apex to 2 mm. at dorsum. Generally paler below and has slightly different seasonal forms.

Sub-sp. ***apella*** Swinhoe 1886 : ♂ Mhow ; type B.M. 9 ♂, 7 ♀ C. India. 15 ♂, 15 ♀ Orissa. 2 ♂, 1 ♀ Ganjam. 12 ♂, 11 ♀ Bengal. 10 ♂, 8 ♀ Mussoorie to Kumaon. 6 ♂, 2 ♀ Sikkim. 1 ♂ " Borneo ".

(*c*) ♂ upf dark border 4 mm. on F and 7 mm. on H.

Sub-sp. ***amatrix*** De Nicéville 1891 : ♂ Tilin Yaw, N. Burma. 8 ♂, 3 ♀ Tilin Yaw. 13 ♂, 2 ♀ Pegu Yoma. 2 ♂ S. Shan States. 4 ♂, 2 ♀ Karens. 1 ♂, 1 ♀ Bassein. 8 ♂, 8 ♀ Ataran. 1 ♀ Tavoy. 5 ♂ Siam.

12a (11). Unf dark area under cell not extending beyond mid wing. H cell $= \frac{1}{2}$ wing.

12 (13a). Unh spots mid space 7 and mid cell conjoined. ♂ F 23 mm., purple, border 2 mm. and a black spot at end of cell. ♀ purple-blue with broad borders. Below, variegated with yellow, purple, grey and brown areas. Fig. *Lep. Ind.* Corbet 82 g.

singla De Nicéville 1885 : ♂ Sikkim. 1 ♂ Mussoorie. 1 ♂, 1 ♀ Kumaon. 1 ♀ Nepal. 7 ♂, 6 ♀ Sikkim. 3 ♂, 1 ♀ Bhutan. 19 ♂, 13 ♀ Assam. 26 ♂, 13 ♀ N. Burma to Karens. 1 ♂ Yunnan. 1 ♀ "Perak ".

13a (12). Unh spots mid space 7 and mid cell wide apart as usual.

13b (19). Unf discal spot in space 4 not nearer to termen than to the end-cell spot.

13 (14a. Unh and apex unf powdered pale violet scales. ♂ blue. Considerable seasonal and individual variation.

bazalus. Four sub-species. Fig. Corbet 59 and 81 g.

(*a*) Unh costal half of wings conspicuously paler, markings faint, tornal lobe brown, white scaling under the tornal metallic scaling usually absent. ♀ purple-blue.

Sub-sp. ***turbata*** Butler 1881 : ♂ Japan ; type B.M. 21 ♂, 24 ♀ Japan.

(*b*) Unh markings yellowish on the white-scaled purple-brown ground. Unh of wet season form more uniform, tornal lobe black with some metallic green scaling.

Sub-sp. ***teesta*** De Nicéville 1886 : ♂ Sikkim ; type B.M. 6 ♂, 4 ♀ China (W. and SE.). 3 ♂, 5 ♀ Formosa. 2 ♂ Kumaon. 17 ♂, 15 ♀ Sikkim. 17 ♂, 17 ♀ Assam. 3 ♂, 12 ♀ N. Burma to Karens. 1 ♂ Mergui. 1 ♂, 1 ♀ Peninsular Siam.

(*c*) ♀ quite different from other forms. Large, F 24 mm., clear blue, dark border on costa F to vein 6, leaving dark spot end cell and another mid-space 5 ; border 2½ mm. mid termen : uph mostly blue with dark veins, border 5 mm. to 2½ mm. mid-termen.

Sub-sp. ***zalinda*** Corbet 1941 : ♀ Kedah ; type B.M. 1 ♂, 2 ♀ Kedah, Malaya.

(*d*) ♂ F 23 mm., very dark blue, border F 1 mm., H 4 mm. Below, like *teesta* wet season form. ♀ more purple-blue than blue.

Sub-sp. ***bazalus*** Hewitson 1862 : ♀ Java ; type B.M. 1 ♀ Malaya. 2 ♂, 10 ♀ Sumatra. 24 ♂, 18 ♀ Java.

Synonyms *nebenius* Fruhstorfer 1914 : ♀ Sumatra ; type B.M.

pratinas Fruhstorfer 1914 : ♂ W. Java : type B.M.

14a (13). Unh and apex unf no pale violet scaling. ♂ green.

14 (15a). ♂ upf apical half black.

horsfieldi. Four sub-species. Fig. Corbet 63 and 77 g.

(*a*) Above green colour brighter, more extensive. ♀ blue, border 3½ mm.

Sub-sp. ***eurysthenes*** Fruhstorfer 1914 : ♂ Tenasserim. 1 ♂, 1 ♀ Karens. 2 ♂, 3 ♀ Ataran. 18 ♂, 18 ♀ Mergui. 3 ♂, 4 ♀ Victoria Point. 2 ♂ Peninsular Siam. 1 ♂ Langkawi Is.

(*b*) Larger, ♂ F 24 mm., extent of green colour very variable, ♀ purple. Below ochreous-brown with broad markings.

Sub-sp. ***basiviridis*** De Nicéville 1891 : ♂ Malaya. 12 ♂, 1 ♀ Malaya. 26 ♂, 6 ♀ Sumatra. 4 ♂ Banka. 17 ♂, 4 ♀ Borneo.

Synonyms *herodianus* Fruhstorfer 1914 : ♂ W. Sumatra ; type B.M.

leokrates Fruhstorfer 1914 : ♂ Borneo ; type B.M.

(*c*) Unh tornal metallic scaling larger. ♀ above dark border broader.

Sub-sp. ***serpa*** Fruhstorfer 1899 : ♂ Nias. 6 ♂, 3 ♀ Nias.

Synonym *biru* Fruhstorfer 1914 : ♂ Nias ; type B.M.

(*d*) Small, ♂ F 20 mm. : base to mid-wing shining green and in cell H. ♀ purple, border as in ♂. Below, grey-brown, with small markings, conspicuous on F, faint on H.

Sub-sp. ***horsfieldi*** Pagenstecher 1890 : ♂ Java. 24 ♂, 16 ♀ Java.

Synonym *vellanus* Fruhstorfer 1914 : ♂ W. Java ; type B.M.

15a (14). ♂ upf green extending nearly to apex.

15b (18). ♂ uph with a broad dark border.

15c (17). Unh discal spots normal.

15 (16). ♂ wings not produced, termen F convex : upf border at apex 1 to 3 mm.

eumolphus. Four sub-species. Fig. Corbet 62 and 76 g.

(*a*) ♂ F 23 mm., border 3 mm. at apex to 4 mm. at dorsum ; uph green to just beyond end cell. ♀ purple-blue, border 6 to 7 mm.

Sub-sp. ***eumolphus*** Cramer 1780 : ♂ Bengal Coast. 28 ♂, 26 ♀ Sikkim. 15 ♂, 7♀ Assam, 1 ♂, 5 ♀ N. Burma. 2 ♂, 3 ♀ S. Shan States. 14 ♂, 8 ♀ Karens. 4 ♂, 5 ♀ Bassein. 3 ♂, 1 ♀ Ataran. 8 ♂ Siam. 20 ♂, 14 ♀ Hainan.

Synonyms *bupola* Hewitson 1878 : ♀ Sikkim : type B.M.

elis Fruhstorfer 1914 : ♂ Sikkim ; type B.M.

tagore Fruhstorfer 1914 : ♂ Assam ; type B.M.

(*b*) ♀ purple area much more extensive, border 3 mm. on F and H. ♂ border F narrower.

Sub-sp. ***maxwelli*** Distant 1885 : ♀ Malaya. 2 ♀ Ataran. 1 ♂ Tavoy. 12 ♂, 6 ♀ Mergui. 1 ♀ Cochin-China. 1 ♀ Peninsular Siam. 22 ♂, 16 ♀ Malaya. 25 ♂, 26 ♀ Sumatra. 1 ♂ N. Pagi Is. 15 ♂, 9 ♀ Banka. 19♂, 14 ♀ Borneo.

Synonyms *farquhari* Distant 1885 : ♂ Malaya ; type B.M.

caesarion Fruhstorfer 1914 : ♂ Sumatra ; type B.M.

caesetius Fruhstorfer 1914 : ♂ Borneo.

(*c*) ♀ bright pale blue instead of purple.

Sub-sp. ***adonias*** Hewitson 1862 : ♀ Java ; type B.M. 28 ♂, 32 ♀ Java.
Synonyms *grynea* Hewitson 1878 : ♀ Java ; type B.M.
aytonia Fruhstorfer 1914 : ♀ W. Java ; type B.M.
(*d*) ♀ paler than *adonias*.
Sub-sp. ***aristomachus*** Fruhstorfer 1914 : ♀ Palawan. None in B.M.

16 (15). ♂ wings produced, termen F straight. ♂ upf border at apex not > ½ mm.
hellenore. Two sub-species. Fig *Lep. Ind.*
(*a*) ♂ F 24 mm. Below more or less variegated : costal half H and apical half F more or less whitened. ♀ purple-blue, border F 4 mm. Unh tornal metallic scaling faint or absent.
Sub-sp. ***hellenore*** Doherty 1889 : ♂ Mergui. ♂ Chittagong. 17 ♂, 19 ♀ Assam. 3 ♂, 3 ♀ N. Burma. 17 ♂, 15 ♀ Shan States. 9 ♂, 2 ♀ Karens. 9 ♂, 9♀ Ataran. 8 ♂, 1 ♀ Tavoy. 1 ♂ Mergui. 1 ♂ N. Siam. 6 ♂, 2 ♀ Cambodia. 5 ♂, 6 ♀ Hainan. 1 ♂ " Java "
Synonyms *viridissima* Swinhoe 1890 : ♂ Mandalay ; type B.M.
sanherib Fruhstorfer 1914 : ♂ Java ; type B.M. Fig. in *Rhop. Java*, but locality seems very doubtful.
(*b*) ♂ upf border very narrow, not reaching apex. Unh metallic scaling conspicuous. ♀ differs from *maxwelli* in the greater extent of the purple beyond the cell upf and between the veins above the costa.
Sub-sp. ***siroes*** Fruhstorfer 1914 : ♂ Sumatra ; type B.M. 12 ♂, 7 ♀ Sumatra. (From Malaya in coll. Eliot.)

17 (15c). Unh discal spots abnormal, those in spaces 6, 7 enlarged and conjoined to the spots mid-space 7 and mid-cell. ♂ above, as *eumolphus*. ♀ purple-blue scaling to beyond end cell upf, leaving a dark spot end cell, dark border 6½ mm. Fig. Seitz 150*d*.
staudingeri Semper 1890 : ♂ Mindanao. 1 ♀ Mindanao.

18 (15b). ♂ uph all green. Fig. Seitz 162*a* as *heliagabulus*.
chamaeleona. Two sub-species.
(*a*) ♂ F 25 mm. Below, uniform brown, no white areas : unh with well-developed tornal metallic scaling.
Sub-sp. ***rileyi*** Joicey & Talbot 1922 : ♂ Ceram ; type B.M. 4 ♂, 2 ♀ Ceram.
(*b*) ♂ F 23 mm., entirely green with a violet flush on outer half of wing in a side light. ♀ bright blue, border 4 mm. Below, variegated with whitened areas, as in *hellenore* : unh no metallic scaling.
Sub-sp. ***chamaeleona*** Bethune-Baker 1903 : ♂ Aroa Bay ; type B.M. 5 ♂, 3 ♀ Schouten Is. 3 ♂, 2 ♀ Mefor Is. 1 ♂, 3 ♀ Jobi Is. 4 ♂ W. New Guinea. 54 ♂, 5 ♀ British New Guinea.
Synonyms *elegabulus* Fruhstorfer 1914 : ♂ Aroa R. ; type B.M.
restricta Rothschild 1915 : ♀ W. New Guinea ; type B.M.
heliagabulus Seitz 1926 : mis-spelling.

19 (13b). Unf discal spot in space 4 nearer to termen than to end-cell spot. ♂ F 23 mm., very dark purple-blue, border ½ mm. at apex to 1 mm. at tornus and on H. ♀ purple-blue, border 2½ mm. Below, dark purple brown. Fig. Seitz 150B *b*.
bella Bethune-Baker 1896 : ♂ Borneo. 1 ♀ " Sikkim ". 1 ♂, 3 ♀ Borneo.

20a (11b). Unh discal spot in space 6 not outwardly concave.
20b (22). Unf without a conspicuous dark area in basal half of space 1b.
20 (21). Below ochreous-brown. Fig. Seitz 150*e*, *f*.
tameanga. Two sub-species.
(*a*) ♂ F 22 mm., much lighter violet-blue. Unf discal band continued to vein 1. ♀ border narrower, decreasing to 1½ mm. at tornus F and 1 mm. uph.

Sub-sp. ***acta*** *nov.* : ♂ Sumatra ; type B.M. 1 ♂ Sumatra. 1 ♀ Malaya.

(*b*) ♂ F 27 mm., very dark violet-blue, border a thread. ♀ lighter purple-blue, border 4 mm., and dark spot at end cell.

Sub-sp. ***tameanga*** Bethune-Baker 1896 : ♂ Borneo ; type B.M. 2 ♂, 1 ♀ Borneo. 1 ♀ Labuan.

21 (20). Below plain brown. Fig. Corbet 78 g and, as *bella*, 100.

overdijkinki Two sub-species.

(*a*) ♂ F 22 mm., shining rather dark violet blue, broad border, 7 mm. at apex to 2½ mm. at tornus, 1 mm. on H. ♀ brighter blue, border as ♂ and dark spot end cell F.

Sub-sp. ***unda*** *nov.* : ♂ " India " (probably Malaya) ex coll. Hewitson ; type B.M. 1 ♂, 1 ♀ Malaya. (♀ S. Johore in coll. Eliot).

(*b*) ♂ F 21 mm., lustrous purple, with outer half F from mid-costa to tornus broadly black : H with costal and apical half of outer margin broadly darkened. ♀ shining blue, with a dark spot at end of cell.

Sub-sp. ***overdijkinki*** Corbet 1941 : ♂ Java ; type B.M. 27 ♂, 21 ♀ Java.

22 (20b). Unf basal half of space 1b conspicuously dark brown.

corinda. Three sub-species. Fig. Corbet 57 and 72 g.

(*a*) Above paler, ♀ bluer.

Sub-sp. ***corestes*** Corbet 1941 : ♂ Langkawi Is. ; type B.M. 1 ♀ Ataran. 8 ♂, 2 ♀ Mergui. 1 ♀ Victoria Point. 4 ♂, 2 ♀ Langkawi Is.

(*b*) ♀ uph purple-blue colour as extensive as in ♂.

Sub-sp. ***acestes*** De Nicéville 1893 : ♂ Perak. 1 ♀ Malaya. 1 ♀ Sumatra. 5 ♂, 9 ♀ Borneo. 1 ♂, 1 ♀ Java.

(*c*) ♂ F 25 mm., very dark blue, border a thread. ♀ purple-blue, border 3 mm., continued along dorsum.

Sub-sp. ***corinda*** Hewitson 1869 : ♂ Philippines ; type B.M. 2 ♂, 1 ♀ Mindanao. 1 ♂, 1 ♀ Luzon. 2 ♂, 1 ♀ Philippines.

H. CENTAURUS GROUP OF NARATHURA

1a (12a). Unh discal band more or less broken at vein 6.

1b (8a). Unf discal band of even width or tapering towards dorsum.

1c (3a). Unh discal spot in space 6 outwardly concave.

1 (2). Unf discal band curved (see Appendix 6 for name).

centaurus. Seven sub-species. Fig. Seitz 150*a*. Corbet 93 and 70 g.

(*a*) ♂ F 29 mm., shining dark purple-blue : ♀ blue, basally conspicuously brighter : border 1½ to ½ mm. ♂, 8 to 3 mm. ♀.

Sub-sp. ***pirama*** Moore 1880 : ♂ Ceylon ; type B.M. 13 ♂, 13 ♀ Ceylon. 13 ♂, 13 ♀ N. Kanara.

(*b*) Above, more uniform, borders the same.

Sub-sp. ***pirithous*** Moore 1883 : ♂ NE. Bengal ; type B.M. 26 ♂, 26 ♀ Sikkim. 13 ♂, 13 ♀ Assam.

(*c*) ♂ upf border ½ mm. Above, bases much brighter.

Sub-sp. ***coruscans*** Wood-Mason & De Nicéville 1880 : ♂ Andaman Is. 13 ♂, 13 ♀ Andaman Is.

(*d*) Darker, uniform purple-blue, border ½ mm.

Sub-sp. ***centaurus*** Fabricius 1775 : ♂ " New Holland " (recte Malaya) ; type B.M. (Banks coll.). 41 ♂, 41 ♀ N. Burma to Victoria Point. 40 ♂, 40 ♀ Siam, Indo-China, Hainan. 24 ♂, 24 ♀ Malaya. 9 ♂, 2 ♀ Sumatra. 3 ♂ Nias. 5 ♂, 6 ♀ Banka. 1 ♂ Mentawi Is. 1 ♂ Natuna Is. 16 ♂, 10 ♀ Borneo.

Synonyms *nakula* Felder 1860 : ♂ Sumatra ; type B.M.

cervidius Fruhstorfer 1914 : ♂ Borneo ; type B.M.

(*e*) Large, ♂ F 30 mm. Above, as *centaurus*. Below markings broader and more showy, particularly the tornal metallic scaling.

Sub-sp. ***centenitus*** Fruhstorfer 1914 : ♂ Batu Is. ; type B.M. 1 ♂, 1♀ Batu Is. 1 ♂ N. Pagi Is.

(*f*) Below much more variegated than *centaurus*. Variable.

Sub-sp. ***pseudo-centaurus*** Doubleday 1847 : ♀ Java ; type B.M. 31 ♂, 31 ♀ Java. 9 ♂, 11 ♀ Bali. 1 ♂, 1 ♀ Kangean Is. 5 ♂, 7 ♀ Lombok. 6 ♀ Sumbawa. 20 ♂, " Aru " (probably Java).

Synonym ***amazona*** Pagenstecher 1890 : ♂ Java.

(*g*) Unf white outer edge of the spot end cell nearly fused to the inner edge of the discal band. Unh vareigated.

Sub-sp. ***aglais*** Felder 1865 : ♂ Luzon ; type B.M. 7 ♂, 1 ♀ Luzon. 5 ♂ Philippines. 13 ♂, 1 ♀ Mindanao.

2 (1). Unf discal band straight.

araxes. Nine sub-species. Fig. Seitz 149 *e* and 149 *b* as *eupolis*.

(*a*) ♂ F 27 mm., shining blue, darker apically, border 1 mm. to a thread at dorsum F and H. Fig. *Rhop. Java* as *amantes*.

Sub-sp. ***onetor*** Fruhstorfer 1914 : ♂ Savu ; type B.M. 2 ♂ Sumatra. 1 ♂, 3 ♀ Java. 1 ♂ Sumbawa. 9 ♂, 9 ♀ Sumba. 9 ♂, 9 ♀ Savu Is. 3 ♂, 3 ♀ Kisser. 1 ♂ Wetter. 1 ♂ Alor. 1 ♂ Moa Is. 1 ♀ Timor. 2 ♀ Larau Luka Is.

Synonym ***aphobus*** Fruhstorfer 1914 : ♂ Java ; type B.M.

(*b*) ♂ like *araxes*, smaller. ♀ pale blue, dark border intermediate to *onetor*.

Sub-sp. ***verelius*** Fruhstorfer 1914 : ♂ Kalao ; type B.M. 3 ♂, 3 ♀ Kalao.

(*c*) Small, ♂ F 26 mm., darker, like *onetor*, ♀ as *araxes*.

Sub-sp. ***talauta*** *nov.* : ♂ Talaut ; type B.M. 4 ♂, 4 ♀ Talaut.

(*d*) ♂ F 29 mm., brilliant shining blue, darkening apically, border 1½ mm. at apex to ½ mm. at dorsum and on H. ♀ light blue, dark border broader than the blue area.

Sub-sp. ***araxes*** Felder 1865 : ♂ Celebes ; type B.M. 12 ♂, 23 ♀ Celebes. 1 ♂, 2 ♀ Sangir. 2 ♂ Sula-Mangoli.

Synonym *grandiosa* Fruhstorfer 1914 : ♂ Celebes.

(*e*) ♂ above dull purple, border a thread : ♀ bluer, border 3 mm. Below, light brown, no violet gloss. ♂ F 26 mm.

Sub-sp. ***philtron*** Fruhstorfer 1914 : ♂ Yule Is. ; type B.M. 4 ♂, 4 ♀ Key Is. 1 ♂, 1 ♀ Aru. 13 ♂, 11 ♀ New Guinea. 4 ♂, 4 ♀ Yule Is. 1 ♂ Sudest Is. 2 ♂, 2 ♀ St. Aignan. 1 ♂ New Hebrides.

(*f*) Similar, but below, with a violet gloss.

Sub-sp. ***eupolis*** Miskin 1890 : ♂ Cape York. 29 ♂, 29 ♀ Queensland.

(*g*) Much duller than *eupolis*. ♀ more often purple.

Sub-sp. ***asopus*** Waterhouse & Lyell 1914 : ♂ Darwin. 11 ♂, 11 ♀ Darwin.

(*h*) ♂ F 26 mm., dark shining blue, border ½ mm. ♀ bright shining blue, border 8 mm. on F, 1 mm. on H. Below much darker brown.

Sub-sp. ***eurisus*** Druce 1891 : ♂ Guadalcanal ; type B.M. 1 ♂, 2 ♀ St. Mathias. 2 ♂, 5 ♀ Squally Is. 7 ♂, 2 ♀ Witu. 3 ♂, 2 ♀ Duke of York Is. 6 ♂, 3 ♀ New Hannover. 13 ♂, 3 ♀ New Britain. 20 ♂, 13 ♀ New Ireland. 2 ♂ Tulagi. 1 ♂, 4 ♀ Niasan. 2 ♂ Treasury Is. 9 ♂, 16 ♀ Guadalcanal. 2 ♂, 3 ♀ Gavota Is. 2 ♂ Choiseul. 4 ♂, 4 ♀ Bougainville. 2 ♀ Ysabel Is. 1 ♂ Florida Is. 1 ♀ Shortland Is. 1 ♂ Vella Lavella. 1 ♀ Ulawa Is. 1 ♀ Fauro Is. 1 ♂ Rendova.

(*i*) ♀ purple instead of blue. Perhaps a dimorph.

Sub-sp. ***tindali*** Ribbe 1899 : Shortland Is. 1 ♀ Malaita. 1 ♀ Bougainville. *Note.*—Absence of *araxes* in the Moluccas is remarkable.

3a (1c). Unh discal spot in space 6 not outwardly concave.

3b (5a). Unh discal spot in space 6 very broad and overlapping the end-cell spot.

3 (4). Unh a spot at the base of space 6 (a unique feature), which may be conjoined to the discal spot in space 6. Unf discal band broad and straight. ♂ F 26 mm., above as *meander*: below dark purple-brown, markings very broad.

lata *nov.*: ♂ Halmaheira; type B.M. 5 ♂ Halmaheira.

4 (3). Unh no spot at base of space 6. Unf discal band curved. Above as *meander*. Below, like *lata*. Unh usually a whitish area between the discal spots in spaces 6, 7 and the central spots. ♂ F 25 mm.

adherbal Grose-Smith: ♂ Milne Bay; type B.M. 1 ♂ Halmaheira. 1 ♂ Aru. 3 ♂ Waigou. 1 ♂ Amberfron Is. 16 ♂, 1 ♀ W. New Guinea. 5 ♂, 2 ♀ Central New Guinea. 3 ♂, 2 ♀ British New Guinea.

Synonym *appianus* Grose-Smith 1902: ♂ Humboldt Bay; type B.M.

5a (3b). Unh discal spot in space 6 not overlapping the end-cell spot.

5 (6, 7). Below, ochreous-brown with distinct narrow markings. Unf discal band narrow, straight, tapering towards tornus. ♀ F 20 mm., purple with broad dark borders, 7 mm. at apex to 5 mm. at dorsum F and 3 mm. on H.

wanda *nov.*: Wandesi, Geelvink Bay, New Guinea type B.M. Unique.

6 (5, 7). Below plain brown, markings faint: unf discal band irregular and broken at vein 4. ♂ F 22 mm., bright shining blue, border a thread: ♀ purple-blue; broad borders.

hylander Grose-Smith 1894: ♂ Schouten Is.; type B.M.: fig. *Rhop. Exot.* 2 ♂, 1 ♀ Schouten Is., New Guinea.

7 (5, 6). Below, very dark purple, markings well defined. Unf discal band sinuous, narrow. ♂ F 25 mm., dark blue, border a thread. Genitalia aberrant, distal end of clasp on ventral side very conspicuously produced.

styx *nov.*: ♂ New Britain, Kinigunang, C. Ribbe; type B.M. 2 ♂ New Britain. 1 ♂ Guadalcanal. 1 ♂ Ysabel, Solomon Is.

8a (1b). Unf discal band tapering to costa.

8 (9a). Unh discal band completely dislocated at vein 1b. Below, violet with more or less conspicuous whitish areas at apex F and H: unh mid-termen broadly darkened. F more produced. ♂ F 26 mm. (21 mm. in Louisade Is.). Above, like *meander* but dark border rather wider in Australia than elsewhere.

madytus Fruhstorfer 1914: ♂ Queensland; type B.M. 2 ♂ Amboina. 1 ♂ Aru. 1 ♂ Waigou. 16 ♂, 5 ♀ W. New Guinea. 10 ♂ Central New Guinea. 5 ♂ British New Guinea. 3 ♂ Woodlark Is. 4 ♂ St. Aignan. 6 ♂, 1 ♀ Sudest Is. 2 ♀ Russell Is.

9a (8). Unh discal band more or less constricted at vein 1b rather than dislocated.

9b (11). Unh discal spot in space 6 not overlapping the end-cell spot.

9 (10). Below, uniform violet (often fading to brown) with narrow and regular discal bands: unh discal band from space 2 to space 5 more or less in line. ♂ F 23 mm., dark blue, border a thread. ♀ purple, border broad on F narrow on H.

meander Boisduval 1832: ♂ W. New Guinea; type B.M. 6 ♂, 3 ♀ Waigou. 1 ♂ Salawati. 7 ♂ Mioswar Is. 1 ♂ Jobi. 36 ♂, 3 ♀ W. New Guinea. 11 ♂, 1 ♀ Central New Guinea. 5 ♂ British New Guinea. 2 ♂ Fergusson Is. 1 ♂ Dampier. 1 ♀ Vulcan Is. 2 ♂ " New Britain ". 2 ♂ " Solomons ".

Synonyms *periander* Grose-Smith 1894: ♂ Jobi; type B.M.

anicius Fruhstorfer 1914: ♂ " Solomons "; type B.M.

10 (9). Below brown or purple-brown, markings more or less irregular. Unh discal band with the spot in space 3 pushed out of line. Above, as *meander*.

philander. Eight sub-species. Fig. Seitz 150B *a* (badly).

(*a*) Below brown without any trace of purple wash. Unf discal band broad. Unh darker about mid-termen. ♂ F 26 mm.

Sub-sp. ***philander*** Felder 1865 : ♂ Halmaheira ; type B.M. 1 ♂ " Sangir ". 11 ♂, 5♀ Halmaheira. 5 ♂ Batchian. 2 ♂, 2 ♀ Obi. 3♂ Gebi.

(*b*) ♂ F 25 mm. Below purple-brown, with somewhat irregular dark reddish-brown markings. Very variable : unf apical area may be whitish : unh centre of termen may be broadly darkened and central area may be whitish : some, all brown unh.

Sub-sp. ***leander*** *nov.* : ♂ Humboldt Bay ; type B.M. 3 ♂, 1 ♀ Aru. 1 ♂ Misol. 30 ♂, 13 ♀ Waigou. 1 ♀ Amberfron Is. 11 ♂, 8 ♀ Schouten Is. 2 ♂, 1 ♀ Mefor Is. 2 ♂, 2 ♀ Roon Is. 10 ♂, 5 ♀ Jobi Is. 69 ♂, 13 ♀ W. New Guinea. 22 ♂, 5 ♀ Central New Guinea. 25 ♂, 6 ♀ British New Guinea. 1 ♀ Dampier. 5 ♂, 1 ♀ " New Britain ". 2 ♂, 1 ♀ " Solomons ". 1 ♂ " S. Burma " ex coll. Swinhoe and figured by him in *Lep. Ind.* as ♂ of *constanceae* ! 1 ♀ " Burma Ataran " ex coll. Swinhoe.

(*c*) Below, paler, violet-grey. Unh centrally conspicuously darkened from base to mid-termen.

Sub-sp. ***ander*** *nov.* : ♂ Kapaur ; type B.M. 3 ♂, 2 ♀ W. New Guinea.

(*d*) ♂ F 25 mm., as *philander* below, may have a faint purple wash. Darker blue above, like *gazella.*

Sub-sp. ***pratti*** *nov.* : ♂ Mioswar Is. : C. & J. Pratt ; type B.M. 31 ♂, 4 ♀ Mioswar Is.

(*e*) ♂ F 24 mm. As *philander,* below brown with darker markings. Above, not so dark as *pratti.* ♀ above, purple with broad dark borders as in *leander,* much broader than in *philander.*

Sub.sp. ***gander*** *nov.* : ♂ Fergusson Is. : type B.M. 21 ♂, 9 ♀ Fergusson Is.

(*f*) ♂ F 24 mm., very much paler blue than any other form. Below, rather dark brown with a purple wash : markings rather narrow, but more conspicuously outlined than usual. Unf discal band centrally angled.

Sub-sp. ***meeki*** *nov.* : New Hannover : A. S. Meek ; type B.M. 2 ♂, 1 ♀ New Hannover.

(*g*) ♂ F 26 mm. Lighter blue than usual, but not so light as *meeki.* Below, darker than any other form, with a well-marked purple wash : markings narrow and even, faintly outlined.

Sub-sp. ***gazella*** Fruhstofer 1913 : ♂ New Britain ; type B.M. 17 ♂, 3 ♀ New Britain. 26 ♂, 4 ♀ Witu Is.

(*h*) Large, ♂ F 27 mm. Above, rather dark blue, as *philander.* Below, dark brown, faint purple wash on outer half H and beyond discal band F : markings narrow, clearly defined.

Sub-sp. ***eichhorni*** *nov.* : ♂ New Ireland : A. F. Eichhorn ; type B.M. 7 ♂, 3 ♀ New Ireland.

11 (9b). Unh discal spot in space 6 overlapping end-cell spot. Below, purple-brown, all markings very broad. ♂ F 22 mm. Above as *philander.* Fig. Seitz 149*b* and (as " *menander* ") 147*f.*

kiriwinii Bethune-Baker 1903 : ♂ Trobriand Is. ; type B.M. 21 ♂, 9 ♀ Trobriand Is. 4 ♂ 1 ♀ Fergusson Is. 1 ♂ Woodlark Is. 6 ♂, 4 ♀ British New Guinea.

12a (1a). Unh discal band continuous from costa to vein 2. Unf discal band tapered towards dorsum.

12b (14a). Unh with the usual dark spots and discal band.

12 (13). Unh discal band more or less irregular and may be variegated. End of genitalia clasp equally divided.

micale. Sixteen sub-species. Fig. Seitz 149*f.*

(*a*) Unh markings broad : intervals between the spots in space 7 wider than the spots. ♂ F 25 mm., bright blue turning to violet-blue on outer half F, border a thread. ♀ blue, border F 6 mm. Unh usually a whitish area above cell.

Sub-sp. ***superba*** Röber 1887 : ♂ Batchian. 2 ♂ " Celebes ". 21 ♂, 7 ♀ Halmaheira. 14 ♂, 4 ♀ Batchian. 4 ♂ Ternate. 3 ♂ Morotai. 1 ♂ " Amboina ". 1 ♀ " Buru " 1 ♂ " Cape York ".

(*b*) Smaller, ♂ F 23 mm. ♀ border narrower, 1 to 2 mm. at dorsum F.

Sub-sp. ***obina*** *nov.* : ♂ Obi ; type B.M. 5 ♂, 5 ♀ Obi.

(*c*) Unh markings narrow : intervals between the spots in space 7 wider than the spots. ♂ upf border at apex not > ½ mm. ♂ above, shining pale blue darkening to violet-blue on apical half F. Below, very dark brown, markings faint.

Sub-sp. ***acerba*** Hewitson 1863 : ♂ Goram ; type B.M. 2 ♂ Goram. 2 ♂ Manowalka.

(*d*) As *acerba*, smaller, ♂ F 22 mm. : below, markings more distinct. ♂ more uniform above : ♀ like *superba*.

Sub-sp. ***leptines*** Fruhstorfer 1914 : ♂ Kei Is. : type B.M. 9 ♂, 6 ♀ Kei Is.

(*e*) ♂ F 26 mm., plain purple-blue as *micale*, border ½ mm., ♀ purple-blue with broad border. Below, typically variegated, conspicuous whitish area above cell H and about apex F and H : grades to the *acerba* form.

Sub-sp. ***ribbei*** Röber 1886 : ♂ Aru. 5 ♂, 2 ♀ " Amboina ". 23 ♂, 14 ♀ Aru.

(*f*) ♂ F 24 mm., above as *acerba* : below variegated as *ribbei*.

Sub-sp. ***selymbria*** Fruhstorfer 1914 : ♂ Waigou ; type B.M. 10 ♂, 10 ♀ Waigou. 7 ♀ Misol.

(*g*) ♂ F 27 mm., above as *acerba* : ♀ shining rather dark clear blue, border broad. Below, like *micale*, but unf the whitish areas on either side of the discal band are conspicuously streaked.

Sub-sp. ***bosnika*** *nov.* : ♂ Schouten Is. ; type B.M. 5 ♂, 5 ♀ Schouten Is.

(*h*) ♂ F 27 mm., above as *acerba*. ♀ pale shining blue as *amytis*, border broad. Below, uniform as *micale*, markings broad and clearly defined.

Sub-sp. ***jona*** *nov.* : ♂ Mioswar Is. : type B.M. 2 ♂, 6 ♀ Mioswar Is. 4 ♂, 4 ♀ Jobi. 1 ♀ Mefor Is.

(*i*) ♂ F 26 mm., above as *acerba*. ♀ very variable, from rather dark purple-blue to pale blue, border broad. Below, varying from the pale *micale* type to the variegated *ribbei* form.

Sub-sp. ***novaeguineae*** Strand 1912 : ♂ Teba, New Guinea. 17 ♂, 21 ♀ W. New Guinea.
Synonym *tebaensis* Strand 1921 : ♂ Teba, New Guinea.

(*j*) ♀ F 26 mm., bright shining light blue, as *amytis*, borders broad. Below, variegated or plain. ♂ above, as *acerba*.

Sub-sp. ***centra*** *nov.* : ♀ Simbang, Central New Guinea ; type B.M. 11 ♂, 9 ♀ Central New Guinea. 1 ♂ British New Guinea. 2 ♂ Dampier.

(*k*) ♂ F 26 mm., uniform dark shining blue, border a thread : ♀ dark purple-blue, borders broad. Below, generally plain brown, markings rather faint, but the variegated *ribbei* form occurs rarely.

Sub-sp. ***micale*** Boisduval 1853 : ♂ New Guinea. 6 ♂, 1 ♀ Central New Guinea. 7 ♂, 8 ♀ British New Guinea. 2 ♂, 2 ♀ Yule Is. 3 ♂, 1 ♀ Vulcan Is. 10 ♂, 5 ♀ Fergusson Is.
Synonym *androtion* Fruhstorfer 1914 : ♂ Yule Is. ; type B.M.

(*l*) ♂ F 28 mm., like *micale*, but ♀ light blue with broad (8 mm.) dark border.

Sub-sp. ***cidona*** Fruhstorfer 1914 : ♀ Kiriwini ; type B.M. 17 ♂, 7 ♀ Trobriand Is. 4 ♂, 4 ♀ Woodlark Is.

(*m*) Small, ♂ F 24 mm. Above as *acerba*. Below as *micale*. ♀ as *amytis*.

Sub-sp. ***riuna*** *nov.* : ♂ Riu, Sudest Is. ; type B.M. 1 ♂, 2 ♀ St. Aignan. 2 ♂, 3 ♀ Sudest Is. 1 ♂, 9 ♀ Rossell Is.

(*n*) ♂ F 26 mm., like *acerba*, uph shining light blue, turning conspicuously dark blue on outer half upf : border broader, 1½ mm. at apex to 1 mm. at dorsum F and ½ mm. on H. ♀ paler blue with dark veins, broad dark border. Below, typically variegated like *ribbei*, but grading to the uniform dark form of typical *micale*.

Sub-sp. ***amytis*** Hewitson 1862 : ♂ Cape York ; type B.M. 14 ♂, 5 ♀ Cape York. 2 ♂, 2 ♀ Thursday Is.

Synonym *cyronthe* Miskin 1890 : ♂ Cape York.

(*o*) As *amytis*, but border 4 mm. at apex in ♂.

Sub-sp. ***amphis*** Waterhouse 1942 : ♂ Mackay. 19 ♂, 27 ♀ Queensland (Kuranda, Cooktown, Mackay, Cedar Bay).

(*p*) Small, ♂ F 25 mm. Above like *micale* : below mostly purple-brown, but the *ribbei*-like form occurs.

Sub-sp. ***amydon*** Waterhouse 1942 : ♂ Murray Is. 7 ♂, 3 ♀ Darwin. 1 ♂ Groote Eylandt. 1 ♂ " Port Denison ".

13 (12). Unh discal band quite regular : plain dark brown, markings faint, not variegated. End of clasp of genitalia expanded on the ventral side. Above and below very like *micale.*

alkisthenes Fruhstorfer 1914 : ♂ Central New Guinea ; type B.M. 2 ♂ Batchian. 2 ♂ Mefor Is. 2 ♀ Jobi. 2 ♀ Amberfron Is. 2 ♀ Mioswar Is. 9 ♂, 8 ♀ W. New Guinea. 15 ♂, 19 ♀ Central New Guinea. 3 ♂, 1 ♀ British New Guinea. 5 ♂, 2 ♀ Vulcan Is. 11 ♂, 4 ♀ Dampier Is.

14a (12b). Below not normal.

14 (15). Unh no markings internal to the pale postdiscal band. ♂ F 25 mm., shining light blue, turning to dark blue at apex and costa F, border ½ mm. ♀ shining light blue, border broad. Unf cell spots may be absent, dark discal band in the middle of a broad pale apical area.

aexone. Two sub-species. Fig. Seitz. 147 *g*.

(*a*) Unf discal band wider, 2½ mm. : unh pale postdiscal band 1½ mm.

Sub-sp. ***chrysoana*** Fruhstorfer 1914 : ♂ Halmaheira. 2 ♂ Halmaheira.

(*b*) Unf discal band 1½ mm. Unh pale postdiscal band 2½ mm.

Sub-sp. ***aexone*** Hewitson 1863 : ♂ Waigou ; type B.M. " 1 ♂ Celebes ". 1 ♀ Buru. 1 ♂, 7 ♀ Aru. 2 ♂ Waigou. 6 ♂, 4 ♀ Schouten Is. 4 ♀ Mefor Is. 8 ♂, 7 ♀ W. New Guinea. 7 ♂, 9 ♀ Central New Guinea. 7 ♂, 6 ♀ British New Guinea. 11 ♂, 5 ♀ Fergusson Is. 11 ♂, 11 ♀ Trobriand Is. 1 ♂ Vulcan Is. 2 ♂ Woodlark Is. 1 ♂, 2 ♀ St. Aignan Is. 1 ♂ New Ireland.

Synonyms *herana* Fruhstorfer 1914 : ♂ Fergusson Is. ; type B.M.
natanda Fruhstorfer 1914 : ♂ Fergusson Is. ; type B.M.

15 (14). Unh with central and basal broken white dots and dashes : no discal band. Otherwise as *aexone.* Fig. Seitz 150B *b.*

sophrosyne Grose-Smith 1889 : ♂ Guadalcanal ; type B.M. 1 ♂, 6 ♀ New Ireland. 2 ♂, 1♀ Guadalcanal.

I. VIHARA GROUP OF NARATHURA

1a (3a). H cell < half wing : long tail.

Vihara Sub-group

1 (2). Unf discal band more or less broken at vein 4.

vihara. Three sub-species. Fig. Corbet 55 and 75 g.

(*a*) ♀ blue instead of purple.

Sub-sp. ***hirava*** Corbet 1941 : ♀ Langkawi Is. ; type B.M. 1 ♂ Ataran. 4 ♂ Mergui. 1 ♂ Victoria Point. 1 ♂,2 ♀ Langkawi Is.

(*b*) ♂ F 24 mm., dark violet-blue, border 1 mm. : ♀ purple-blue, border 4 mm. Below, ochreous-brown, markings more macular than usual : with tornal metallic scaling.

Sub-sp. **vihara** Felder 1860 : ♂ Malacca ; type B.M. 8 ♂, 2 ♀ Malaya. 12 ♂, 4 ♀ Sumatra. 13 ♂, 4 ♀ Borneo. 1 ♂ Natuna Is.

(*c*) ♂ F 20 mm., border F 1½ mm. Below, deeper purple-brown.

Sub-sp. **pagia** Corbet 1941 : ♂ N. Pagi Is. ; type B.M. Unique.

2 (1). Unf discal band unbroken.

barami. Three sub-species. Fig. Corbet 56 and 69 g.

(*a*) ♂ F 22 mm., bright shining blue, border very broad 7½ mm. at apex and above cell mostly black. Below markings narrower and unf discal band centrally angled. Sexes alike.

Sub-sp. **woodii** Ollenbach 1921 : ♂ Tavoy ; type B.M. 2 ♂, 1 ♀ Ataran. 6 ♂, 2 ♀ Tavoy. 12 ♂, 10 ♀ Mergui. 1 ♂, 1 ♀ Victoria Point. 1 ♂, 1 ♀ Peninsular Siam.

(*b*) Intermediate between the Burmese and Bornean forms. ♀ purple.

Sub-sp. **penanga** Corbet 1941 : ♂ Malaya ; type B.M. 1 ♀ Victoria Point. 3 ♂, 3 ♀ Malaya.

(*c*) ♂ F 24 mm., purple-blue, border 5 mm. at apex to 3 mm. at tornus and on H : ♀ lighter, border rather broader. Below, ochreous-brown, markings rather darker than the ground.

Sub-sp. **barami** Bethune-Baker 1903 : ♂ Borneo ; type B.M. 13 ♂, 3 ♀ Borneo. 1 ♀ " Java ".

3a (1a). H cell = half wing.

3b (8a). Unf discal band irregular, slightly broken at vein 4. ♂ upf dark border narrow.

Agaba Sub-group

3c (7). Tailed.

3d (6). Tail long, 2½ mm.

3 (4a). Below, conspicuously whitened on all H. ♂ F 21 mm. ♂ dark purple-blue, border ½ mm. : ♀ all brown. Fig. Ormiston 1921 (*Butterflies of Ceylon*).

ormistoni Riley 1920 : ♂ Ceylon ; type B.M. 2 ♂, 1 ♀ Ceylon.

4a (3). Below, purple-brown.

4 (5). Below, variegated with whitish patches unf and unh. ♂ F 20 mm., shining violet-blue, border 1 mm. : ♀ lighter blue, border 4 mm. Fig. Seitz 150*c* and Corbet 52 and 58 g.

agaba Hewitson 1862 : ♂ " India " (recte Cochin China) ; type B.M. 1 ♀ " N. India ". 5 ♂, 1 ♀ Karens. 5 ♂, 1 ♀ Rangoon. 19 ♂, 17 ♀ Ataran. 16 ♀, 12 ♀ Tavoy. 4 ♂, 3 ♀ Mergui. 1 ♀ Victoria Point. 7 ♂, 2 ♀ Siam. 3 ♂, 2 ♀ Cochin China. 1 ♀ Peninsular Siam. 1 ♂ Langkawi Is. 2 ♂ Sumatra.

5 (4). Below, uniform. ♂ F 19 mm., shining violet-blue, border 1½ mm. ♀ lighter, border 5 to 3 mm. and a dark spot at end of cell. Clasp of genitalia bifid as in *buddha*. Fig. Corbet 68 g.

paralea Evans 1925 : ♂ Manipur ; type B.M. 2 ♂, 1 ♀ Assam. 2 ♂, 8 ♀ N. Shan States. 3 ♂, 1 ♀ S. Shan States. 1 ♂ Karens. 1 ♀ Ataran.

6 (3d). Tail short, 1 mm.

buddha. Two sub-species. Fig. Corbet (as *cooperi*) 58 and 71 g.

(*a*) ♂ 17 mm., shining violet-blue, border 1 mm. ; ♀ lighter, border 6 mm. at apex to 2 mm. at dorsum, and dark spot at end of cell. Below brown, markings narrow : tornal metallic scaling conspicuous.

Sub-sp. **cooperi** Evans 1925 : ♂ Mergui ; type B.M. 1 ♀ N. Shan States. 1 ♂ Mergui. 1 ♂ Peninsular Siam. 1 ♂, 2 ♀ Malaya. 1 ♂, 3 ♀ Sumatra. 3 ♂ Banka. 1 ♀ Borneo. 1 ♀ Philippines. 1 ♂ Siberut.

Synonyms *gana* Corbet 1948 : ♂ Malaya ; type B.M.
siberuta Corbet 1941 : ♂ Siberut ; type B.M.
whiteheadi Corbet 1948 : ♀ Borneo ; type B.M.
(*b*) Smaller, ♂ F 18 mm., below purple, tornal metallic scaling reduced.
Sub-sp. ***buddha*** Bethune-Baker 1903 : ♀ Java ; type B.M. 1 ♀ Java.
Synonym *aleta* Piepens 1918 : ♀ Java.

7 (3c). Not tailed.
arvina. Four sub-species. Fig. Corbet 64 and 93 g.
(*a*) Like *aboe*, but ♀ purple-blue with very broad borders, 5 mm. on F and on H, blue only in cell. Unf discal band more evenly curved.
Sub-sp. ***ardea*** Evans 1932 : ♀ Assam ; type B.M. 1 ♂, 9 ♀ Assam. 1 ♂ Hainan.
(*b*) ♂ F 17 to 23 mm., ♂ as *arvina*, ♀ rather pale blue, width of border very variable, from 3 to 6 mm. at apex. Below purple glazed.
Sub-sp. ***aboe*** De Nicéville : ♂ Ataran. 1 ♂, 9 ♀ Ataran. 16 ♂, 13 ♀ Tavoy. 1 ♂ Mergui. 1 ♀ Victoria Point. 3 ♀ Peninsular Siam.
Synonyms *adala* De Nicéville 1895 : ♂ Ataran.
adulans De Nicéville 1895 : ♀ Ataran. Both varieties.
(*c*) Below, plain brown, no purple gloss, with tornal metallic scaling H. ♂ as ***arvina***; ♀ purple, border 6 mm. at apex to 1½ mm. at tornus.
Sub-sp. ***adalitas*** Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂, 1 ♀ Malaya. 3 ♂, 9 ♀ Sumatra. 1 ♀ Borneo.
(*d*) ♂ shining dark blue, border a thread : ♀ shining pale blue, border 4 mm. on F, 5 mm. on H. Below, glazed purple-brown : no tornal metallic scaling on H.
Sub-sp. ***arvina*** Hewitson 1863 : ♂ Java ; type B.M. 2 ♂, 2 ♀ Java.

8a (3b). Unh discal band regular, no break at vein 4. ♂ Upf border broad, except in *labuana*.

Agelastus Sub-group

8b (10a). With long (2½ mm.) tail, white tipped.
8 (9). Below uniform, not variegated. ♂ F 22 mm. Sexes alike. Light blue, border 6 mm. to 3 mm. at dorsum, 6 mm. on H. Below rather pale brown, with tornal metallic scaling.
ocrida Hewitson 1869 : ♂ Mindanao ; type B.M. 1 ♂ Luzon. 3 ♂, 1 ♀ Mindanao. 6 ♂, 1 ♀ Mindoro.

9 (8). Below, variegated with whitish patches at apex F and on H, as in *alaconia*. Above, generally as *ocrida*.
alesia. Three sub-species. Fig. Corbet 54 and 67 g.
(*a*) Above, paler, softer blue than *alesia*, veins not darkened, border narrower : below, much paler and less variegated. Unf markings at apex obsolete.
Sub-sp. ***sacharja*** Fruhstorfer 1914 : ♂ Annam ; type B.M. 1 ♂ Manipur. 1 ♂, 1 ♀ Ataran. 1 ♂, 1 ♀ Siam. 1 ♂ Annam.
(*b*) ♂ F 22 mm. rather larger than ***alesia***: below, darker, particularly above tornus H: unf markings at apex obsolete.
Sub-sp. ***wimberleyi*** De Nicéville 1887 : ♀ Andamans. 1 ♂, 2 ♀ Andamans.
(*c*) ♂ F 20 mm., pale shining blue, border 8 mm. at apex to 6 mm. at tornus. Unf markings at apex conspicuous.
Sub-sp. ***alesia*** Felder 1865 : ♀ Luzon. 7 ♂, 6 ♀ Mindanao.

10a (6b). Tail a tooth, not white-tipped.
10 (11a). Unh variegated, exactly as in ***alesia***. Sexes alike.

alaconia. Four sub-species. Fig. Corbet 66 and 84 g.

(a) ♂ F 18 mm., pale shining blue, border 6 mm. to 3 mm. at dorsum.

Sub-sp. ***aloana*** Corbet 1941 : ♀ Tavoy ; type B.M. 3 ♂, 2 ♀ Karens. 5 ♂, 2 ♀ Ataran. 1 ♂, 5 ♀ Tavoy.

(*b*) Bright blue, not shining, border as in *aloana*.

Sub-sp. ***media*** *nov.* : ♂ Peninsular Siam ; type B.M. 1 ♀ Mergui. 1 ♂, 1 ♀ Peninsular Siam. 1 ♀ Malaya.

(*c*) Above, dark purple with broad dark borders. Below, duller.

Sub-sp. ***alaconia*** Hewitson 1869 : ♂ Borneo ; type B.M. 9 ♂, 3 ♀ Borneo.

(*d*) Above, pale shining blue, border 7 mm. at apex, reaching to end of cell, 4 mm. at tornus and on H.

Sub-sp. ***oberthüri*** Staudinger 1889 : Palawan. 3 ♂, 5 ♀ Palawan.

11a (10). Unh not variegated.

11 (12a). H tornus rounded, dorsum = costa, as in K (*Perimuta*) Group, but termen H is toothed. ♂ F 16 mm. bright shining blue, border 4 mm. at apex to 1½ at dorsum F and mid H. ♀ rather paler and borders rather wider. Below as *agelastus*, tornal metallic scaling conspicuous. Fig. Corbet 68 and 86 g.

wildeyana Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂ Langkawi Is. 6 ♂, 2 ♀ Malaya.

Synonym ***havea*** Corbet 1941 : ♂ Langkawi Is. ; type B.M.

12a (11). H tornus angled, dorsum > costa. ♂ F > 17 mm.

12 (13a). Below, markings conspicuously pale edged, ♂ upf border narrow, ♂ F 21 mm. mm. very dark purple-blue, border 2 mm. at apex to 1 mm. at dorsum and on H. ♀ lighter, borders broad and a dark spot at end of cell F. Unh with conspicuous tornal metallic scaling. Fig. Corbet 72 and 90 g.

labuana Bethune-Baker 1896 : ♂ Labuan. 3 ♂, 1 ♀ S. Burma, Ataran to Victoria Point. 1 ♂ Sumatra. 1 ♀ N. Pagi Is. 7 ♂ Borneo.

Synonym ***etuna*** Corbet 1941 : ♀ N. Pagi Is. ; type B.M.

13a (12). Below, markings inconspicuously pale edged. ♂ upf with broad dark border.

13b (17a). F termen evenly convex throughout.

13c (16). Unh discal band broken at vein 4 as usual.

13d (15). H tooth at end of vein 2 inconspicuous. Unh no metallic scaling.

13 (14). Below, pinkish-grey. ♂ F 18 mm., violet-blue, border F 5 mm. at apex to 2 mm. at tornus and on H. Fig. *Lep. Ind.* : Corbet 91 g. Genitalia distinct from its allies.

aeeta De Nicéville 1893 : ♂ Ataran. 1 ♂ Manipur. 1 ♂ N. Chin Hills. 6 ♂, 4 ♀ Ataran. 1 ♂ S. Annam.

14 (13). Below, grey-brown, otherwise as *aeeta*. Fig. *Lep. Ind.* and Corbet 87 g. ♀ much lighter blue.

zeta Moore 1877 : ♀ Andaman Is. ; type B.M. 8 ♂, 4 ♀ Andaman Is. 2 ♂, 2 ♀ " Borneo " ex coll. Adams, probably from Andaman Is.

Synonym ***roona*** Moore 1884 ; ♂ Andaman Is.

15 (13d). H tooth at end of vein 2 conspicuous ½ to 1½ mm., but not white-tipped. Unh with metallic scaling.

arsenius. Two sub-species.

(*a*) ♂ F 20 mm., dark purple-blue, ♀ lighter and with dark spot at end of cell, border 5 mm. at apex to 2 mm. elsewhere. Tail short ½ mm.

Sub-sp. ***arsenius*** Felder 1867 : ♂ Luzon : figured. 2 ♂, 1 ♀ Luzon.

(*b*) Tail 1½ mm. Unh metallic scaling more profuse.

Sub-sp. ***everetti*** ***nov.*** : ♂ Mindoro : Everett ; type B.M. 6 ♂, 4 ♀ Mindoro.

16 (13c). Unh discal band not broken at vein 4 : with or without metallic scaling.

agelastus. Two sub-species. Fig. Corbet 70 and 89 g.

(a) ♂ F 21 mm., purple-blue, border 6 mm. at apex to 1½ mm. at dorsum and 1 mm. on H : ♀ bluer. Very variable in respect of width of border and presence or absence of metallic scaling unh. Below ochreous-brown.

Sub-sp. ***perissa*** Doherty 1889 : ♂ Tavoy. 1 ♀ Pegu Yoma. 23 ♂, 14 ♀ Karens. 17 ♂, 10 ♀ Ataran. 10 ♂, 6 ♀ Tavoy. 9 ♂, 8 ♀ Mergui. 3 ♂ Victoria Point. 1 ♂, 2 ♀ Peninsular Siam.

(*b*) Below, dull plain brown, markings fainter, metallic scaling conspicuous.

Sub-sp. ***agelastus*** Hewitson 1862 : ♂ " India " ; type B.M. 3 ♂, 2 ♀ Malaya.

17a (13b). F termen concave before a pointed apex. Unh no metallic scaling. A link to J. (*Rama*) Group.

17 (18). F termen straight. ♂ F 22 mm., purple, border 6 mm. at apex to 4 mm. at dorsum and on H : ♀ blue with broader borders. Below brown with a faint purple wash.

asopia Hewitson 1869 : ♂ Moulmein ; type B.M. Fig. Corbet 71 and 88 g. 15 ♂, 15 ♀ Assam. 4 ♂, 8 ♀ N. Burma to S. Shan States. 11 ♂, 7 ♀ Ataran. 4 ♂, 11 ♀ Tavoy.

18 (17). F termen convex.

asinarus. Two sub-species. Fig. Seitz 150 *g* as *tounguva.*

(*a*) ♂ F 21 mm., rather dark shining blue, border 7 mm. at apex to 3 mm. at dorsum and 2 mm. on H. Below, darker and may have a faint purple gloss. ♀ blue, border as ♂.

Sub-sp. ***tounguva*** Grose-Smith 1887 : ♀ Toungoo ; type B.M. 2 ♀ Karens. 3 ♀ Bassein. 16 ♂, 11 ♀ Rangoon. 1 ♂ " Andamans ".

(*b*) ♂ F 19 mm., borders narrower : below, paler.

Sub-sp. ***asinarus*** Felder 1865 : ♂ Cochin ; type B.M. 5 ♂, 1 ♀ Ataran. 1 ♀ Tavoy. 4 ♂, 1 ♀ Siam. 2 ♂, 4 ♀ Indo-China.

Synonym *enoma* Corbet 1946 : ♀ S. Annam ; type B.M.

J. RAMA GROUP OF NARATHURA

1a (3a). H not tailed.

1 (2). Unh discal spots in spaces 4, 5 mid termen and end-cell spot.

paramuta. Two sub-species. Fig. Corbet 76 and 97 g.

(*a*) ♂ F 17 mm., purple-blue, border 2½ mm. : ♀ paler, border broader. Below, pale brown, markings faint.

Sub-sp. ***paramuta*** De Nicéville 1883 : ♂ Sikkim. 50 ♂, 14 ♀ Sikkim. 1 ♂ Nepal. 24 ♂, 16 ♀ Assam. 1 ♀ N. Burma. 20 ♂, 6 ♀ N. Shan States. 1 ♂, 1 ♀ S. Shan States. 3 ♂, 6 ♀ Karens. 1 ♂ Siam. 1 ♀ Szechwan. 1 ♂ Canton.

Synonym *newara* Moore 1884 : ♂ Nepal ; type B.M.

(*b*) Larger, ♂ F 18 mm., upf borders 4 mm. Below, rather darker.

Sub-sp. ***horishana*** Matsumura 1910 : Formosa. 8 ♂, 6 ♀ Formosa.

2 (1). Unh discal spots in spaces 4, 5 much nearer to end-cell spot than to termen. ♂ F 16 to 19 mm., dark border 3 mm. Below markings vary from sharply defined as in *dodonaea* to dull as in ***rama***. Fig. Seitz, vol. 1.

japonica Murray 1875 : ♂ Japan. 32 ♂, 32 ♀ Japan. 1 ♀ Liu Kiu Is. 3 ♂, 3 ♀ Korea. 2 ♀ Formosa. 1 ♂, 1 ♀ " China ".

Synonym *kotoshona* Sonan 1947 : Formosa.

3a (1a). H tailed.

3b (5a). H not conspicuously lobed at tornus.

3 (4). Below, purple-brown.

rama. Two sub-species. Fig. Corbet 94 g : Seitz 150B *d*. ♂ F 21 mm., shining dark purple-blue, border 1½ to 3 mm. : ♀ bluer and borders broader. Below, rather pale brown with a glossy sheen, markings faint.

Sub-sp. **rama** Kollar 1842 : Himalayas. 5 ♂, 7 ♀ Central China. 1 ♂, 1 ♀ Foochow. 10 ♂, 1 ♀ Szechwan. 24 ♂, 20 ♀ Kashmir to Nepal. 8 ♂, 8 ♀ Sikkim.

Synonyms *querceti* Moore 1857 : N. India ; type B.M.

violacea Röber 1886 : E. Indies.

(*b*) ♂ above, bluer and more shining, border narrower ½ to 2 mm. Below, darker, more conspicuously purple washed.

Sub-sp. **ramosa** Evans 1925 : ♂ N. Shan States ; type B.M. 9 ♂, 9 ♀ Assam. 2 ♂, 2 ♀ N. Burma. 10 ♂, 8 ♀ N. Shan. States. 20 ♂, 6 ♀ S. Shan States. 7 ♂, 1 ♀ Ataran.

4 (3). Below, grey. ♂ F 20 mm. Sexes alike. Above, blue with broad border, 6 mm. at apex, 5 at dorsum F, 4 mm. on H. Termen F very crenulate. Fig. Seitz 150*f* and Corbet 95 g.

dodonaea Moore 1857 : ♂ N. India ; type B.M. 3 ♂, 3 ♀ Afghanistan. 1 ♂, 5 ♀ Chitral. 43 ♂, 55 ♀ Kashmir to Kumaon. 2 ♀ Sikkim.

5a (3b). H conspicuously lobed at tornus : dorsum concave.

5 (6). Unf discal band unbroken. F termen conspicuously concave. ♀ F 16 mm. Above purple-blue, border 4 mm. mid-termen F, 3 mm. on H. Unf brown, paler and purple washed at apex, markings faint : discal band continued into space 1 b : costal spot in space 10. Unh reddish-brown, with a purple wash : markings broad and black : discal spot in space 6 separated from the spot in space 5 and overlaps the end-cell spot.

curiosa *nov.* : ♀ Dokyong La, Bhutan 10,000 ft. : 25th March, 1927 : F. M. Bailey. Unique.

6 (5). Unf discal band very broken and irregular. F termen straight. Sexes alike. ♂ F 18 mm. : blue with very broad borders : below, reddish-brown, with faint purple gloss and dark markings. Fig. *Lep. Ind.* : Corbet 96 g.

comica De Nicéville 1900 : ♂ near Bhamo, N. Burma. 1 ♂, 1 ♀ Manipur. 2 ♂, 1 ♀ S. Shan States. 1 ♀ Siam (Tukdah).

Synonym *learmondii* Tytler 1940 : ♂ S. Shan States : type B.M.

K. PERIMUTA GROUP OF NARATHURA

1a (3a). Unf discal band broad, 2 mm.

1 (2). Unh with central yellow area.

perimuta. Two sub-species. Fig. Corbet 75 and 66 g.

(*a*) F 17 mm., dark shining blue, border 1½ mm. : ♀ bright blue, border 5 mm.

Sub-sp. **perimuta** Moore 1857 : ♂ Sylhet ; type B.M. 15 ♂, 11 ♀ Sikkim. 23 ♂, 23 ♀ Assam. 36 ♂, 24 ♀ N. Burma to Tavoy. 2 ♂ Siam.

(*b*) ♂ bright shining metallic blue : ♀ border 3 mm.

Sub-sp. **regina** Corbet 1941 : to replace *regia*. 25 ♂, 21 ♀ Mergui. 3 ♂, 2 ♀ Victoria Point. 5 ♂, 4 ♀ Peninsular Siam. 1 ♀ Malaya.

Synonyms *regia* Evans 1925 : ♂ Mergui ; type B.M. Homonym.

linta Corbet 1941 : ♀ Malaya ; type B.M.

2 (1). Unh no central yellow area. Sexes alike.

epimete. Three sub-species. Fig. Corbet 65 and 92 g.

(*a*) ♂ F 17 mm., bright shining blue, border 6 mm. at apex to 2 mm. at dorsum : on H, only blue in cell. Below, pale purple-brown, variegated with white at apex F and H.

Sub-sp. **duessa** Doherty 1889 : ♂ Tavoy ; type B.M. 12 ♂, 6 ♀ Ataran. 4 ♂ Tavoy. 3 ♂ Mergui. 1 ♀ Victoria Point, S. Burma.

(*b*) Below, darker uniform brown, with a purple wash.

Sub-sp. **suedas** Corbet 1941 : ♂ Malaya ; type B.M. 1 ♂ Malaya.

(*c*) ♂ F 18 mm., purple, border 5 mm. at apex to 3 mm. at dorsum. Below, light brown with faint purple wash.

Sub-sp. **epimete** Staudinger 1889 : ♂ Palawan. 2 ♂ Borneo. 1 ♂, 1 ♀ Palawan.

3a (1a). Unf discal band narrow, 1 mm.
3b (6a). Unh no tornal metallic scaling.
3 (4a). Below, markings conspicuous. ♂ F 17 mm. shining blue, border 5 mm. at apex to 2 mm. at dorsum and on H. Below, markings small. Fig. Corbet 67 and 85 g.
cardoni Corbet 1941 : ♂ Malaya ; type B.M. Unique.

4a (3). Below, markings faint.
4 (5). Unh discal band completely broken at vein 2. ♂ F 23 mm., dark violet-blue, no border.
inornata. Two sub-species. Fig. Corbet 73 and 63 g, 64 g.
(*a*) ♀ paler purple-blue, border 3 mm. at apex to ½ mm. at dorsum and on H. Unf discal band narrow, sinuous.
Sub-sp. ***inornata*** Felder 1860 : ♂ Malaya ; type B.M. 2 ♀ Peninsular Siam. 3 ♂, 7 ♀ Malaya. 4 ♂, 5 ♀ Sumatra. 1 ♀ " Philippines ".
Synonym *brahma* Bethune-Baker 1897 : ♂ Perak ; type B.M. A small specimen, ♂ F 19 mm.
(*b*) ♀ purple, border 8 mm. at apex to 5 at dorsum : on H 5 mm. and the veins darkened.
Sub-sp. ***empesta*** Corbet 1941 : ♂ Borneo ; type B.M. 3 ♂, 2 ♀ Borneo.

5 (4). Unh discal band overlapping at vein 2. ♂ F 16 mm. very dark violet-blue, border 3 mm. at apex to 2 mm. mid-termen and 4 mm. at dorsum. ♀ dark purple-blue to just beyond end cell F and only in cell H. Fig. Seitz 148*f*.
davaona Semper 1890 : ♂ Mindanao. 26 ♂, 11 ♀ Mindanao.

6a (3b). Unh with tornal metallic scaling. Below, spots faint.
6 (7). Unh discal band completely broken at vein 2.
antimuta. Three sub-species. Fig. Corbet 74 and 65 g.
(*a*) ♀ bluer.
Sub-sp. ***tana*** Corbet 1941 : ♂ Ataran ; type B.M. 1 ♂, 3 ♀ Karens. 9 ♂, 9 ♀ Ataran. 23 ♂, 24 ♀ Tavoy. 9 ♂, 5 ♀ Mergui. 3 ♂, 1 ♀ Victoria Point.
(*b*) ♂ F 16 mm., dark violet-blue, border ½ mm. : ♀ purple-blue, border 5 mm. at apex to 3 mm. at dorsum, 2 mm. on H where the veins are black.
Sub-sp. ***antimuta*** Felder 1865 : ♂ Malacca ; type B.M. 2 ♂ Peninsular Siam. 26 ♂, 14 ♀ Malaya. 10 ♂, 4 ♀ Sumatra. 1 ♂, 1 ♀ Nias. 1 ♂ Natuna Is.
Synonym *davisonii* De Nicéville 1890 : ♂ Singapore.
(*c*) ♀ more purple than blue.
Sub-sp. ***timana*** Corbet 1941 : ♂ Borneo ; type B.M. 7 ♂, 6 ♀ Banka. 30 ♂, 13 ♀ Borneo. 4 ♂ " Java " (not in *Rhop. Java*).

7 (6). Unh discal band overlapping at vein 2.
avatha. Two sub-species. Fig. Corbet 26 and 28 g.
(*a*) ♂ F 16 mm., dark violet blue, border 1½ mm. : ♀ shining purple, border as in *antimuta*, but broader on H.
Sub-sp. ***avatha*** De Nicéville 1896 : ♂ Sumatra. 6 ♂ Malaya. 4 ♂, 1 ♀ Sumatra.
(*b*) ♂ F 14 mm. Below, markings not faint, small and macular : unf discal band slightly broken at vein 4 : unh cilia white-tipped at end of vein 2.
Sub-sp. ***lana nov.*** : ♂ Mindanao : A. E. Wileman ; type B.M. Unique.

L. Fulla Group of Narathura

1a (3a). Unh markings complete.
1 (2). Unh discal band completely broken at vein 6.
acron. Two sub-species. Fig. Seitz 150 *g*.

(*a*) ♂ F 23 mm., brilliant shining blue, turning darker at apex F, border ½ mm. ♀ similar, but apex broadly black, 9 mm. to 6 at dorsum : H only blue in cell. Below, brown with conspicuously white-edged markings.

Sub-sp. ***acron*** Hewitson 1862 : ♂ Batchian ; type B.M. 5 ♂, 3 ♀ Halmaheira. 8 ♂, 2 ♀ Batchian.

(*b*) ♂ similar. ♀ shining light blue, border 7 mm. at apex to 1 mm. at dorsum and on H. Below, white with pale brown markings. Fig. Seitz 149 *g*.

Sub-sp. ***azenia*** Hewitson 1863 : ♂ Waigou ; type B.M. 24 ♂, 4 ♀ Obi. 1 ♂, 1 ♀ Ceram. 1 ♂ Aru. 2 ♂, 1 ♀ Misol. 10 ♂, 1 ♀ Waigou. 1 ♂, 1 ♀ Jobi. 20 ♂, 12 ♀ W. New Guinea. 8 ♂, 2 ♀ Central New Guinea. 16 ♂, 16 ♀ British New Guinea.

2 (1). Unh discal band not completely broken at vein 6.

admete. Three sub-species. Fig. Seitz 149*c*.

(*a*) ♂ F 20 to 24 mm., dark blue, border 2 mm. at apex to 1 mm. elsewhere. ♀ purple-blue with broad borders. Unh dark brown, discal band outwardly more or less white-edged.

Sub-sp. ***admete*** Hewitson 1863 : ♂ Ceram ; type B.M. 14 ♂, 14 ♀ Halmaheira. 2 ♂ Batchian. 11 ♂, 6 ♀ Obi. 7 ♂, 4 ♀ Ceram. 4 ♂ Amboina.

(*b*) ♀ blue or purple. Unh purple-brown, typically with a broad white band exterior to the discal band, but, particularly in ♀, this band may be reduced or absent : no trace of metallic scaling.

Sub-sp. ***eucolpis*** Kirsch 1877 : ♂ Jobi. 2 ♂, 1 ♀ Misol. 17 ♂, 5 ♀ Waigou. 5 ♂, 5 ♀ Jobi. 14 ♂, 14 ♀ W. New Guinea. 24 ♂, 15 ♀ British New Guinea. 2 ♂ Goodenough Is. 6 ♂, 4 ♀ Rossell. 13 ♂, 4 ♀ Sudest Is.

Synonym *waigeoensis* Bethune-Baker 1903 : ♂ Waigou ; type B.M.

(*c*) Louisade specimens generally are referable to *eucolpis*, but there is also a sub-specifically different form. ♂ 18 mm., much brighter, shining blue. ♀ very pale shining blue, border as in *eucolpis*. Below, much paler grey, no purple wash.

Sub-sp. ***sudesta*** *nov.* : ♂ Sudest Is. ; type B.M. 1 ♂ Rossell Is. 5 ♂, 4 ♀ Sudest Is.

3a (1a). Unh markings incomplete.

3 (4). Below, white. ♂ F 20 mm., rather pale blue, border 1 mm. ♀ white, blue suffusion at darkened bases, border F 5 mm. Below, well marked post-discal band, interior to which small dark markings of the usual type may be more or less present or entirely absent.

disparilis Felder 1860 : ♂ Amboina ; type B.M. ; figured in *Reise Novara*. 3 ♂, 1 ♀ Amboina.

Synonym *courvoisieri* Ribbe 1901 : ♂ Ceram.

4 (3). Below, not white : generally no markings interior to the discal band on either wing.

fulla. Seven sub-species. Fig. Corbet 90 and 113 g.

(*a*) ♂ F 19 mm., bright shining blue, border at apex 2 mm., elsewhere ½ mm. ♀ pale shining blue, border 7 mm. at apex, 1½ mm. at dorsum, 1 mm. on H. Below dull pale brown, markings narrow and faint.

Sub-sp. ***andamanica*** Wood-Mason & De Nicéville 1881 : ♂ Andaman Is. 19 ♂, 19 ♀ Andaman Is.

Synonym *subfasciata* Moore 1881 : ♂ Andaman Is. : type B.M.

(*b*) Below, more ochreous brown., ♂ border F narrower.

Sub-sp. ***ignara*** Riley & Godfrey 1921 : ♂ N. Siam ; type B.M. 6 ♂, 1 ♀ N. Shan States. 6 ♂, 1 ♀ Ataran. 1 ♂ Tavoy. 6 ♂, 4 ♀ Mergui. 8 ♂ Victoria Point, S. Burma. 5 ♂ Siam.

(*c*) ♂ more purple-blue, border a thread : termen more rounded. ♀ purple with broader borders. Below, dull pale brown, discal band H much broader.

Sub-sp. ***intaca*** Corbet 1941 : ♂ Borneo : type B.M. 1 ♂ Peninsular Siam. 5 ♂, 2 ♀ Malaya. 2 ♂, 1 ♀ Borneo.

(*d*) ♂ F 16 mm., dark shining blue, border 1 mm. : ♀ purple, border 5 mm. at apex to 1 mm. at dorsum. Below, like *intaca*, but unh with a subtornal black spot in space 2 crowned with metallic scales and a similar vestigial spot at the tornus.

Sub-sp. ***santa*** *nov.* : ♂ Luzon ; type B.M. 3 ♂, 1 ♀ Luzon.

(*e*) ♂ F 19 to 23 mm., very dark blue, border ½ mm. ♀ purple with broad border F. Below, grey-brown : unh with whitish postdiscal band and tornal black spots crowned white and with some metallic scaling.

Sub-sp. ***canulia*** Hewitson 1869 : ♂ " Philippines ", recte Halmaheira ; type B.M. 13 ♂, 5 ♀ Halmaheira. 1 ♂, 1♀ Ternate. 3 ♂ Obi.

Synonym *sosias* Fruhstorfer 1914 : ♂ Obi ; type B.M.

(*f*) ♂ 19 mm., bright shining blue, border 1 mm. at apex, ½ mm. elsewhere. ♀ bluer, border 7 mm. at apex, 2 mm. at dorsum and 1 mm. on H. Below, ochreous-brown, very like *ignara*, but with faint whitish postdiscal and submarginal bands on H.

Sub-sp. ***fulla*** Hewitson 1862 : ♂ Buru ; type B.M. 6 ♂, 2 ♀ Amboina. 17 ♂, 2 ♀ Buru.

Synonym *prasia* Fruhstorfer 1914 : Amboina ; type B.M.

(*g*) Above, as *fulla*, ♀ bluer. Below, discal bands better marked and very broad on unh, 4 mm. All unh and apical part of unf more or less reddened and purple glazed.

Sub-sp. ***babsi*** Joicey & Talbot 1917 : ♂ Waigou ; type B.M. 6 ♂, 1 ♀ Misol. ♂ 6, 2 ♀ Waigou. 2 ♂, 3 ♀ British New Guinea. 1 ♂ Sudest Is.

M. Genus ***AUREA*** ***gen. nov.***

1a (4). Below, markings of the *Narathura* type : unf with 3 cell spots and a discal band.

1 (2a). Below, plain brown, markings inconspicuous. ♂ F 20 mm., brilliant shining green, border a thread at apex increasing to ½ to 1½ mm. at dorsum, 5 mm. on H. ♀ blue or purple with broad borders. Termen F convex in ♂. Fig. Corbet 60 and 73 g.

aurea Hewitson 1862. ♂ Borneo ; type B.M. 9 ♂, 16 ♀ Malaya. 4 ♂, 3 ♀ Sumatra. 17 ♂, 8 ♀ Borneo.

Synonyms *borneensis* Bethune-Baker 1896 : ♂ Borneo.
tembaga Moulton 1911 : ♂ Borneo ; type B.M.

2a (1). Below, purple glazed, markings conspicuous.

2 (3). ♂ above, as ***aurea***, but border F a thread and on H 3 mm., but the green colour reaches termen in space 6 : termen F straight. ♀ above, purple-blue, like ***aurea***.

trogon Distant 1884 : ♂ Malaya. Fig. Corbet 61 and 74 g. 7 ♂, 12 ♀ Malaya. 3 ♂, 4 ♀ Sumatra. 1 ♂, 1 ♀ Boneo.

Synonym ***rajah*** Moulton 1911 : ♀ Sarawak ; type B.M.

3 (2). ♂ above, as ***aurea***, but border H broader, 6 mm. : no basal bluish reflection as is conspicuous in ***trogon*** and faint in ***aurea***. Below, as ***trogon***.

stinga ***nov.*** : ♂ Johore ; type B.M. 2 ♂ Malaya.

4 (1a). Below, markings abnormal : greyish-brown : unf dark brown bar at end of cell and a narrow, sinuous discal band : unh tornal half of wing darkened, the usual basal and central spots very small, end-cell spot continued to costa, discal band begins at vein 6 and is not broken at vein 2. ♂ F 19 mm., brilliant shining green, no dark border, but mid-termen to tornus on H the green colour changes to violet-blue for a width of 2½ mm. ♀ purple with broad dark borders. Fig. Corbet 91 and 114 g.

caeca Hewitson 1863 : ♂ Borneo ; type B.M. 2 ♂, 1 ♀ Borneo. Hewitson's type is an aberrant and stained specimen. There is a ♂ from Malaya in coll. Stubbs and a ♂ from Sumatra in coll. Nieuwenhuis of Rotterdam.

N. GENUS ***ARHOPALA*** Boisduval 1832

1a (3a). Unf discal band macular and angled at vein 6.

1 (2). Unh no white area mid dorsum.

thamyras. Five sub-species. Fig. Aurivillius 1882: *Kong. Svenska Vet.-Ak. Handlingar* **19/5** : 109, Pl. 1, fig. 2.

(*a*) Below striped, markings concolorous with ground.

Sub-sp.***anthore*** Hewitson 1862 : ♂ Batchian ; type B.M. 22 ♂, 6 ♀ Halmaheira. 16 ♂, 16 ♀ Batchian. 2 ♂, 2 ♀ Ternate. 16 ♂, 16 ♀ Obi.

Synonym *potidaea* Fruhstorfer 1913 : ♂ Obi ; type B.M.

(*b*) Intermediate between *anthore* and *phryxus* : markings unh rather darker than ground, rather elongate tending to be striped. ♂ F 23 mm., brilliant shining light blue, turning violet about apex F, border ¾ mm. ♀ paler blue, border 6 mm. at apex, decreasing to 2 mm. at dorsum and 1 mm. on H : much narrower than in *anthore*.

Sub-sp. ***thamyras*** Linnaeus 1758 : ♂ Indies (recte Amboina). 19 ♂, 12 ♀ Amboina. 2 ♀ Saparoea. 10 ♂, 2 ♀ Buru. 5 ♂, 6 ♀ Ceram.

Synonyms *helius* Cramer 1779 : ♂ Surinam (recte Amboina).
esra Herbst 1800. *helus* Godart 1823 : to replace *helius*.
carolina Holland 1900 : ♂ Buru ; paratype in B.M.
tamyrus Bethune-Baker 1903 : mis-spelling.

(*c*) Unh outwardly whitened : otherwise as *phryxus*.

Sub-sp. ***anthelius*** Staudinger 1888 : ♂ Aru. 2 ♂, 1 ♀ Key Is. 6 ♂, 6 ♀ Aru. 18 ♂, 4 ♀ Misol.

Synonym *calaureia* Fruhstorfer 1911 : ♂ Misol ; type B.M.

(*d*) Unh markings fully macular and conspicuously darker than the ground : uniform. Very variable.

Sub-sp. ***phryxus*** Boisduval 1832 : ♂ New Guinea. 19 ♂, 6 ♀ Waigou. 5 ♂, 5 ♀ Schouten Is. 6 ♂, 5 ♀ Mefor. 6 ♂, 1 ♀ Jobi. 10 ♂, 6 ♀ Mioswar Is. 18 ♂, 18 ♀ W. New Guinea. 5 ♂, 5 ♀ Central New Guinea. 13 ♂, 13 ♀ British New Guinea. 1 ♂ Salawatti. 3 ♂ Vulcan Is. 6 ♂, 4 ♀ Dampier. 5 ♂ Rook Is. 10 ♂, 1 ♀ Trobriand Is. 11 ♂, 11 ♀ Fergusson Is. 7 ♂, 7 ♀ Woodlark Is. 8 ♂, 4 ♀ St. Aignan Is. 11 ♂, 1 ♀ Sudest Is. 7 ♂, 5 ♀ Rossell Is. 12 ♂, 2 ♀ Admiralty Is. 56 ♂, 29 ♀ Solomon Is. (Ugi, Guadalcanal, Tugela, Bougainville Rendova, Ulava, Alu, Choiseul, Florida, New Georgia, Vella Lavella, Ysabel, Kulanbangre, Guizo, Tulayi, Niasam).

Synonyms *sophax* Matthew 1887 : ♂ Ugi ; type B.M.
latimarginata Strand 1912 : ♂ Teba, New Guinea.
interniplaga Strand 1912 : ♂ Waigou.
teuthrone Fruhstorfer 1913 : ♂ Eilanden R., New Guinea ; type B.M.
zelea Fruhstorfer 1913 : ♂ Fergusson Is. ; type B.M.

(*e*) Below, grey and markings much smaller.

Sub-sp. ***minnetta*** Butler 1882 : ♂ Duke of York Is. ; type B.M. 9 ♂, 5 ♀ New Hannover. 7 ♂, 4 ♀ New Ireland. 3 ♂, 6 ♀ Witu Is. 1 ♂, 1 ♀ Duke of York Is. 9 ♂, 9 ♀ New Britain. 5 ♀ St. Mathais. 11 ♂, 5 ♀ Squally Is.

2 (1). Unh with a conspicuous white area mid-dorsum extending to vein 1b. ♂ F 18 mm. : above as *thamyras* ; below, much darker than any *thamyras* form : markings all macular, scarcely darker than the ground, but conspicuously white-edged.

helianthes Grose-Smith 1902 : ♂ Milne Bay : figured ; type B.M. 3 ♂ Waigou. 5♂ W. New Guinea. 5 ♂, 1 ♀ British New Guinea.

3a (1a). Unf discal band not macular, nor angled. Unh tornal area broadly darkened. ♀ above, as *thamyras*.

3b (5). Unh discal and central markings macular.

3 (4). Unh no white area mid-dorsum. ♂ F 22 mm., as *thamyras*, but apical half F much darker blue and borders broader, 3½ mm. at apex to 1 mm. at dorsum and on H. Unh like *thamyras phryxus*.

arta *nov.*: ♂ Owgarra, Upper Aroa R., British New Guinea: A. S. Meek; type B.M. 1 ♀ Jobi Is. 2 ♂, 2 ♀ W. New Guinea. 3 ♂, 5 ♀ British New Guinea.

4 (3). Unh with white area mid-dorsum, as in *helianthes*. Appears to be a species intermediate between *arta* and *axiothea*. ♂ F 21 mm., above as *arta*. Unf central and end-cell spots connected by a dark band as in *axiothea*. Unh markings as in *arta*, but tornal area much darker.

axina *nov.*: ♂ Wangaar River, 15 miles from coast, W. New Guinea, 600 ft.: January 1921: C. & J. Pratt; type B.M. 1 ♂, 1 ♀ W. New Guinea. 5 ♂ British New Guinea.

5 (3b). Unh discal and central markings conjoined to continuous bands on a white ground. ♂ F 22 mm., above like *arta*. Unf white, central and end-cell spots continued as bands to costa, where they are conjoined. Unh white area mid-dorsum is extended to the base. Fig. Seitz 146B *b*.

axiothea Hewitson 1862: ♂ New Guinea; type B.M. 1 ♂ Misol. 24 ♂, 8 ♀ Jobi. 1 ♂, 1 ♀ New Guinea.

Synonym *strophe* Grose-Smith 1877: ♀ Kapaur; type B.M.

O. Genus ***PANCHALA*** Moore 1882

1a (3a). Not tailed. Sexes alike.

1 (2). Unf markings conspicuously darker than ground. F conspicuously falcate and H angled at apex.

ganesa. Five sub-species. Fig. Seitz 147*f* and Corbet 98 g.

(*a*) ♂ F 15 mm., blue with broad dark border F. Unh whitish, markings faint on a white ground. Upf white-flanked black spot about end of cell.

Sub-sp. ***ganesa*** Moore 1857: N. India. 41 ♂, 41 ♀ N. India (Chitral to Kumaon). 1 ♂ Sikkim.

(*b*) Below, bases rather pale purple-brown: markings F more prominent, not being overlaid whitish: H markings prominent.

Sub-sp. ***watsoni*** 1912: ♀ Chin Hills; type B.M. 4 ♂, 4 ♀ Assam. 1 ♀ Chin Hills. 1 ♀ S. Shan States.

(*c*) Upf black spot at end cell not white flanked, at least in ♂.

Sub-sp. ***seminigra*** Leech 1890: ♂ Chang Yang; type B.M. 1 ♂, 10 ♀ W. China. 1 ♂, 1 ♀ Chang Yang. 2 ♂, 2 ♀ Hainan.

(*d*) Upf no black spot at end of cell; blue colouring as extensive as in *seminigra*.

Sub-sp. ***formosana*** Kato 1930: Formosa. None in B.M.

(*e*) Blue colouring much restricted, duskier: vestigial on H.

Sub-sp. ***loomisi*** Pryer 1886: ♂ Kanozan. 8 ♂, 5 ♀ Japan.

2 (1). Unf and unh marking faint on the grey ground. Wings rounded. F 15 mm.: powdery blue, border 5 mm. at apex to 2 mm. at dorsum: 1 mm. on H, where all space 6 is darkened and the veins are dark on both wings. Unf discal band broken at vein 4, not continued below vein 2, reaches vein 10 and there are faint costal spots in spaces 10 and 11. Unh very like *ganesa*, but with two tiny submarginal black dots as in *paraganesa*: no metallic scaling.

weelii Piepers 1918: "♂" Java; type Leiden Mus., the Director of which kindly sent me the type for examination. It was found to have the long, slender, tapered form of ovipositor characteristic of the *Ganesa* Group. None in B.M.

3a (1a). Tailed.

3b (6a). Below, markings darker than the ground.

3 (4a). Unf discal spots in spaces 2, 3, 4 in line and inwardly flanked by an equally broad whitish band as in *ganesa*.

paraganesa. Four sub-species. Fig. Seitz 147*b* (badly).

(*a*) ♂ F 15 mm., sexes alike. Dry season form almost exactly like *ganesa* : wet season form has the blue colour restricted, particularly on H, where it may be confined to the cell.

Sub-sp. ***paraganesa*** De Nicéville 1882 : Sikkim. 2 ♂ Kumaon. 3 ♀ Nepal. 31 ♂, 8 ♀ Sikkim.

(*b*) The type pertains to the wet season form, where on upf the powdered blue colouring only extends to just beyond the end of the cell on F and is absent on H. Dry season specimens are more like *paraganesa*. Sexes alike.

Sub-sp. ***zephyretta*** Doherty 1891 : ♂ Assam ; type B.M. 29 ♂, 8 ♀ Assam. 1 ♀ Chin Hills. 9 ♂, 13 ♀ N. Shan States. 6 ♂, 14 ♀ S. Shan States. 1 ♂ Karens. 1 ♂ Ataran. 1 ♂, 1 ♀ W. Siam.

(*c*) ♂ above, bright blue colouring extensive, dark border F 4 mm. at apex to 2 mm. at dorsum, like *ammonides*. ♀ as *paraganesa*.

Sub-sp. ***mendava*** Corbet 1941 : ♂ Larut Hill, Perak ; type B.M. and 1 ♀ Maxwell Hill, Malaya.

(*d*) ♀ F 15 mm. : above as *ammonides*, unf as *paraganesa*, unh as *ammonides*, with a conspicuous large white spot mid-costa and apex broadly white.

Sub-sp. ***hammon*** Fruhstorfer 1914 : ♀ Java ; type B.M. Figured in *Rhop. Java* as *ammon*. 2 ♀ Java.

4a (3). Unf spot in space 4 out of line. Sexes not alike.

4 (5). Unf spots in spaces 3 and 4 quite separate. ♂ F 18 mm., rather pale blue, border a thread in dry season form, 2 mm. at apex F to 1 mm. at dorsum in wet season form (*ellisi*). ♀ like *ganesa*, above and below. Fig. Seitz 150B *d* : Corbet 99 g.

aberrans De Nicéville 1888 : ♂ Ataran. 1 ♀ Sikkim. 5 ♂, 11 ♀ Assam. 48 ♂, 48 ♀ N. Burma to Ataran. 1 ♂ Yunnan.

Synonym *ellisi* : Evans 1914 : ♂ Maymyo ; type B.M.

5 (4). Unf spots in spaces 3 and 4 overlap.

birmana. Two sub-species. Fig. Corbet 77 and 100 g.

(*a*) ♂ F 17 mm., rather dark blue, border 4 mm. at apex to 2 mm. at dorsum and 2½ mm. on H, narrower in dry season form. ♀ above as *ganesa*, seasonally variable. Below of the *ganesa* type : unh may be uniform or with a large white subcostal and apical area.

Sub-sp. ***birmana*** Moore 1883 : ♀ Karens ; type B.M. 20 ♂, 27 ♀ Manipur. 42 ♂, 27 ♀ N. Burma to Ataran. 1 ♂, 1 ♀ Hong-Kong. 1 ♂ " Sumatra ".

Synonyms *arisba* De Nicéville 1891 : ♂ Tilin Yaw, N. Burma.
corthatha Fruhstorfer 1914 : ♂ Hong Kong.
dascia Swinhoe 1917 : ♂ Karens ; type B.M.
maymoica Tytler 1926 : ♂ N. Shan States ; type B.M.

(*b*) Smaller, ♂ F 15 mm., border broader : ♀ border much broader : no white-edged dark spot at end of cell.

Sub-sp. ***asakurae*** Matsumura 1910 : Formosa. 2 ♂, 2 ♀ Formosa.

Synonyms *uchidae* Matsumura 1926 : ♂ Formosa.
oryuzana Corbet 1941 : Formosa : placed as the Formosan form of *paraganesa* with Wileman as author (not traceable) ; type B.M.

6a (3b). Below, markings not darker than the ground. Unf spot in space 4 out of line.

6 (7a). Unh in space 7, central spot generally not nearer to the discal than to the basal spot : tornal metallic scaling absent, or rarely, vestigial.

ammonides. Five sub-species. Fig. Corbet 79, 80 and 102 g.

(*a*) ♂ F 15 mm., dark blue with broad borders, 4 mm. ♀ paler blue, border 6 mm. and on H only vestigial blue scaling in cell. Unh generally with large subcostal white spot.

Sub-sp. ***elira*** Corbet 1941 : ♂ Assam ; type B.M. 11 ♂, 9 ♀ Assam.

(*b*) Larger, ♂ F 16 mm. Unh no large white subcostal spot.

Sub-sp ***bowringi*** *nov.* : ♂ Hainan ; type B.M. 3 ♂, 1 ♀ Hainan.

(*c*) ♂ F 14 mm., bright shining light blue, sexes alike ; border 5 mm. at apex to 2 mm. at dorsum and on H. Unf with conspicuous white subcostal spot : apex unf and unh whitened.

Sub-sp. ***ammonides*** Doherty 1891 : ♂ Tenasserim ; type B.M. 7 ♂, 4 ♀ Ataran. 7 ♂, 3 ♀ Tavoy. 4 ♂, 5 ♀ Mergui. 2 ♂, 2 ♀ Victoria Point.

(*d*) Intermediate to *chunsu*. Above, duller, borders as in *ammonides* : below as *chunsu*.

Sub-sp. ***monava*** Corbet 1941 : ♂ Langkawi Is. : type B.M. Only the type.

(*e*) ♂ above, duller blue, border 5 mm. at apex to 3 at dorsum and 4 mm. on H : ♀ paler, with narrower borders, like *ammonides*. Unh subcostal white spot conspicuous, but apex unf and unh not whitened.

Sub-sp. ***chunsu*** Fruhstorfer 1914 : ♂ Sumatra ; type B.M. 2 ♂ Malaya. 23 ♂, 3 ♀ Sumatra.

7a (6). Unh, in space 7, central spot nearer and linked to the discal spot : tornal metallic scales present.

7 (8). Unh no white spot separating the central and discal spots in space 7. Small, ♂ F 13 mm. Above, dark blue with broad border, as in *ammonides*. Fig. Corbet 78, 82 and 101 g.

ariel Doherty 1891 : ♂ Assam ; type B.M. 1 ♂ Assam. 1 ♂, 1 ♀ Malaya. 1 ♂ Borneo.

Synonym *antis* Corbet 1941 : ♂ Malaya ; type B.M.

8 (7). Unh with a white spot between the central and discal spots in space 7. ♂ above, dark blue, border ½ to 1 mm.

ammon. Two sub-species. Fig. Corbet 81 and 103 g.

(*a*) ♂ F 16 mm. ♀ bright blue to purple, borders as in *ammonides*. Below, purple washed : subcostal white spot H conspicuous.

Sub-sp. ***ammon*** Hewitson 1862 : ♂ Singapore ; type B.M. 14 ♂, 12 ♀ Singapore.

(*b*) ♂ F 17 mm. Below, not purple washed. Unh subcostal white spot inconspicuous.

Sub-sp. ***sarawaca*** Moulton 1912 : ♂ Borneo ; type B.M. 1 ♂ Borneo. The described ♀ is a ♂ of ***ariel***.

P. GENUS ***FLOS*** Doherty 1889

1a (6a). H produced at tornus, vein 1b = vein 2.

1b (5). H tailed.

1c (3a). Unh discal band in spaces 7, 6 oblique and tapered from apex to end-cell spot.

1 (2). Unh with a bifid spot mid-costa, separated from the dark basal area.

diardi. Two sub-species. Fig. Corbet 84 and 106 g.

(*a*) ♂ F 23 mm., dark purple-blue, no border : ♀ purple with broad borders.

Sub-sp. ***diardi*** Hewitson 1862 : ♂ India ; type B.M. 1 ♂, 1 ♀ Sikkim. 21 ♂, 11 ♀ Assam. 26 ♂, 5 ♀ N. Burma to Mergui.

(*b*) ♂ clear dark blue instead of purple-blue.

Sub-sp. ***capeta*** Hewitson 1878 : ♀ Sumatra ; type B.M. 1 ♂, 1 ♀ Peninsular Siam. 1 ♀ Langkawi Is. 5 ♂, 1 ♀ Malaya. 2 ♂, 5 ♀ Sumatra. 4 ♂ Borneo. 14 ♂, 12 ♀ Java. 1 ♂, 1 ♀ Palawan. 1 ♂ Mindoro. 1 ♂, 1 ♀ Philippines.

Synonyms *viardi* Staudinger 1889 : mis-spelling.
almansor Fruhstorfer 1914 : ♀ Malaya ; type B.M.
amha Fruhstorfer 1914 : ♂ Borneo ; type B.M.
asatha Fruhstorfer 1914 : ♂ Java ; type B.M.

2 (1). Unh dark basal area continued as a band to mid-costa.

fulgida. Three sub-species. Fig. Corbet 85 and 107 g.

(*a*) ♂ F 22 mm. Above, dark purple-blue, as *diardi.*

Sub-sp. ***fulgida*** Hewitson 1863 : ♀ " Philippines " (recte Sikkim) ; type B.M. 17 ♂, 17 ♀ Sikkim. 12 ♂, 12 ♀ Assam. 17 ♂, 20 ♀ N. Burma to Tavoy. 1 ♂, 1 ♀ Siam. 1 ♀ Cambodia.

(*b*) Above, clear dark blue, as *diardi capeta.*

Sub-sp. ***singhapura*** Distant 1885 : ♂ Singapore. 3 ♂, 3 ♀ Malaya. 5 ♂, 3 ♀ Sumatra. 1 ♂ Nias. 5 ♂, 2 ♀ Borneo. 1 ♀ Cambodia.

Synonyms *tifata* Fruhstorfer 1914 : ♂ Sumatra ; type B.M.

batis Fruhstorfer 1914 : ♂ Sumatra ; type B.M. Like typical *fulgida* : ? wrong label or variety.

zohar Fruhstorfer 1914 : ♂ Borneo ; type B.M.

tenea Fruhstorfer 1914 : ♂ E. Java ; type B.M.

(*c*) ♂ F 20 mm., above, as *fulgida.* Unh the central and discal markings in space 7 much enlarged.

Sub-sp. ***zilana*** Fruhstorfer 1900 : ♂ Bazilan ; type B.M. 1 ♂, 1 ♀ Bazilan. 1 ♀ Mindoro.

3a (1c). Unh discal band in spaces 7, 6 broad, overlapping end-cell spot and the discal spot in space 5.

3 (4). H single short tail at end of vein 2, as in *fulgida.* ♂ F 21 mm., above as *fulgida.* Below, darker, generally as *fulgida* except for the discal band unh : also the tornal metallic scaling is more extensive than in any other species. Clasp of genitalia with end broadly rounded instead of pointed as in *fulgida.*

bungo *nov.* : ♂ Nias, Kalimbungo : I. Z. Kanniegieter, January, 1896 ; type B.M. 2 ♂ Nias.

4 (3). H long tail at end of vein 2 and a short, white-tipped tail at end of vein 3. Large, ♂ F 25 mm. Generally as *fulgida* but purple colouring of ♀ restricted. Fig. Seitz 150*d.*

kühni Röber 1887 : ♂ Bangkei ; type B.M. 3 ♂, 1 ♀ Bangkei.

Synonyms *imperiosa* Fruhstorfer 1914 : Celebes. Fig. Seitz 162*a.*

lompana Ribbe 1926 : ♂ Bonthain, Celebes.

5 (1b). H no tail, short tooth at end of vein 2.

anniella. Three sub-species. Fig. Corbet 86 and 108 g.

(*a*) ♂ F 19 mm. ; brilliant dark purple-blue, no border : ♀ shining blue (sometimes purple). with broad borders. Unh, basal and central markings obscured by the dark ground.

Sub-sp. ***artegal*** Doherty 1889 : ♀ Tavoy ; type B.M. 3 ♂, 2 ♀ Bhamo. 10 ♂, 3 ♀ Karens. 7 ♂, 5 ♀ Ataran. 2 ♂, 2 ♀ Tavoy. 7 ♂, 7 ♀ Mergui. 2 ♀ Siam.

(*b*) ♂ F 22 mm. ♀ generally purple. Unh basal and central markings more or less conspicuous.

Sub-sp. ***anniella*** Hewitson 1862 : ♂ Singapore ; type B.M. 2 ♀ Peninsular Siam. 8 ♂, 8 ♀ Malaya. 10 ♂, 8 ♀ Sumatra. 10 ♂, 8 ♀ Borneo.

Synonyms *triangularis* Bethune-Baker 1903, as Staudinger MS.

husaina Fruhstorfer 1914 : ♂ Sumatra ; type B.M.

(*c*) Differences not clearly described by author.

Sub-sp. ***malangana*** Toxopeus 1927 : ♂ Java. None in B.M.

6a (1a). H rounded at tornus, vein 1b shorter than vein 2.

6b (11a). Unf conspicuous quadrate white spot mid space 1 b.

6c(10). Tailed.

6d (9). Tail long, 3 mm.

6e (8). Unh basal third more or less variegated.

6 (7). Unh without tornal metallic scaling. ♂ F 21 mm., dark purple, border 2 mm. ♀ blue with broad borders. Unh variegated grey and brown, markings blurred.

adriana De Nicéville 1883 : ♂ Sikkim. 29 ♂, 29 ♀ Sikkim. 2 ♂, 3 ♀ N. Burma to S. Shan States. 1 ♂ Siam. Fig. *Lep. Ind.* Same genitalia as *asoka* of which it may be a dimorph or an ecological sub-species : it is not a seasonal form.

7 (6). Unh with tornal metallic scaling and clearly defined whitish markings on the dark brown ground. Above, as *adriana*, but border upf in ♂ narrower, 1 mm. Fig. Corbet 110 g.

asoka De Nicéville 1883 : ♂ Sikkim. Fig. Seitz 150B *f*. 24 ♂, 24 ♀ Sikkim. 2 ♀ Assam. 13 ♀ N. Burma to S. Shan States. 1 ♀ Yunnan. 3 ♂, 4 ♀ Hong Kong.

Synonyms *chola* Moore 1884 : ♂ Sikkim ; type B.M.

vaya Fruhstorfer 1914 : ♀ Hong Kong ; type B.M.

8 (6e). Unh basal third plain dark brown, marked as *apidanus*. Unf narrow white bar in cell and the dark discal band very broad. ♀ light blue colouring much restricted.

arca De Nicéville 1893 : ♀ Celebes : figured. None in B.M.

9 (6d). H tail short, 1 mm. Unh with tornal metallic scaling. ♂ F 22 mm., shining dark blue, border 1 mm. at apex, ½ mm. elsewhere. ♀ purple with broad borders. Fig. Seitz 150*e*.

chinensis Felder 1865 : ♂ Shanghai ; type B.M. 10 ♂, 14 ♀ Sikkim. 3 ♂, 3 ♀ Bhutan. 17 ♂, 17 ♀ Assam. 1 ♂ W. China. 1 ♂ Shanghai.

Synonyms *moelleri* De Nicéville 1883 : ♂ Assam.

lazula Moore 1884 : ♂ Sikkim ; type B.M.

10(6c). H no tail. Unh no tornal metallic scaling. Similar genitalia to *chinensis* and differs therefrom as *adriana* differs from *asoka*. Fig. Corbet 88 and 111 g.

areste Hewitson 1862 : India. 1 ♂, 1 ♀ Nepal. 8 ♂, 8 ♀ Sikkim. 1 ♂, 1 ♀ Bhutan. 15 ♂, 15 ♀ Assam. 11 ♂, 14 ♀ N. Burma to Ataran. 1♂ Malaya. Coll. Höne (Leipzig) contains 68 ♂, 45 ♀ from Chekiang and 1 ♂, 1 ♀ from Kwang Tung : only 1 ♂ of *chinensis* from Chekiang, as well as an apparent hybrid between the 2 (?) species.

Synonyms *patuna* Moore : ♀ Nepal ; type B.M.

arestina Evans 1925 : ♂ N. Shan States : type B.M.

11a (6b). Unf no conspicuous quadrate white spot mid space 1b.

11b (13). Tailed.

11 (12). H tail long, 3 mm.

apidanus. Seven sub-species. Fig. Corbet 87 and 109 g.

(*a*) ♂ F 20 mm., dark shining blue, border 1½ to 1 mm. ; ♀ pale blue, border broad. Unh central pale area contrasting conspicuously with the basal and sub-tornal dark areas ; tornal metallic scaling vestigial. Back of uncus centrally concave instead of rounded.

Sub-sp. ***ahamus*** Doherty 1891 : ♀ Assam ; type B.M. 1 ♂ Chittagong. 4 ♂. 8 ♀ Assam. 1 ♀ Bhamo. 2 ♂, 8 ♀ Karens. 4 ♂, 3 ♀ Ataran. 2 ♂, 2 ♀ Tavoy. 2 ♂, 2 ♀ Mergui. 2 ♂, 2 ♀ Siam. 1 ♂ " Sumatra ".

(*b*) Duller, darker blue : ♀ more purple. Below, more uniform, like *apidanus*.

Sub-sp. ***saturata*** Snellen 1890 : ♂ Billiton. 9 ♂, 11 ♀ Malaya. 1 ♂, 5 ♀ Sumatra. 2 ♂, 2 ♀ Banka. 12 ♂, 18 ♀ Borneo.

Synonyms *kartaphilus* Fruhstorfer 1914 : ♂ Malaya ; type B.M.

berossus and *viribus* Fruhstorfer 1914 : both ♂ Borneo ; types B.M.

(*c*) Below, looking very different from *saturata*, plain brown unh, no violet washed pale central area and tornal metallic scaling more extensive : ♀ above, purple-blue area more extensive.

Sub-sp. ***phalakron*** Fruhstorfer 1914 : ♂ Sumatra ; type B.M. 4 ♂, 11 ♀ NE. Sumatra.

Synonyms *ambigua, anabas, astrophila, anthracophila* Toxopeus : Sumatra.

(*d*) ♀ purple-blue area more extensive. Below, like *phalakron*, rather than *saturata*, but has more sheen and more extensive metallic scaling.

Sub-sp. ***xisuthrus*** Fruhstorfer 1914 : ♀ Nias ; type B.M. 3 ♂, 9 ♀ Nias.

(*e*) As *saturata*, but ♀ blue. Very variable.

Sub-sp. ***apidanus*** Cramer 1777 : ♂ Surinam (recte Java apud Staudinger, 1889). 16 ♂, 16 ♀ Java. 1 ♂ Bali. 1 ♀ Djampea. 1 ♂, 1 ♀ Sumbawa. 1 ♂, 1 ♀ Tambora. 3 ♂, 7 ♀ Lombok.

Synonyms *dorimond* Stoll 1790 : Cape of Good Hope (recte Java apud Seitz, 1928). *cames* and *antipaxus* Fruhstorfer 1914 : both ♂ Java ; type B.M. *alter* Toxopeus 1929 : Java.

(*f*) Like *apidanus*, but larger. ♂ F 24 mm.

Sub-sp. ***arahat*** Fruhstorfer 1914 : ♂ Bawean ; type B.M. 12 ♂, 12 ♀ Bawean.

(*g*) ♀ purple above. Unh central pale area as conspicuous as in *ahamus*.

Sub-sp. ***palawanus*** Staudinger 1889 : ♂ Palawan. 3 ♂, 4 ♀ Palawan. 1 ♂, 1 ♀ Mindanao. 1 ♂, 4 ♀ Luzon. 7 ♂, 3 ♀ Mindoro. 4 ♀ Philippines. 1 ♀ Celebes.

Note.—The variation in *apidanus* forms (*phalakron* and *saturata*) flying together recalls the *adriana-asoka* and *chinensis-areste* relationships.

12 (11). H tail short, 1 mm. Uncus end triangular. ♂ F 19 mm. Above, as *apidanus*, duller blue : ♀ purple with very broad borders : uph cell only purple. Below, very variable, but unf dark discal band very broad, as in *arca* : red areas at base costa F and H often very conspicuous : unh pale central area narrower and more sharply marked.

iriya Fruhstorfer 1914 : ♂ Bazilan ; type B.M. 3 ♂, 3 ♀ Bazilan. 1 ♂, 1 ♀ Luzon. 15 ♂, 6 ♀ Mindanao. 1 ♂, 1 ♀ Mindoro.

13 (11b). H no tail, termen quite smooth and on unh narrowly white-edged.

morphina. Two sub-species. Fig. Corbet 89 and 112 g.

(*a*) ♂ F 25 mm., brilliant shining dark blue, border a thread. ♀ paler purple-blue, border 4 to 1½ mm. Unh basal quarter black, outer third darkened, central pale brown area with faint markings.

Sub-sp. ***morphina*** Distant 1884 : ♂ Perak. 9 ♂, 2 ♀ Malaya. 2 ♂, 1 ♀ Sumatra. 3 ♂, 1 ♀ Borneo. 1 ♀ Palawan.

(*b*) Smaller, ♂ F 23 mm., duller form.

Sub-sp. ***sidicina*** Fruhstorfer 1914 : ♂ Battak Mts., NE. Sumatra. 1 ♂, 6 ♀ NE. Sumatra.

APPENDIX

1. *Amblypodia* Horsfield 1829 *v.* *Arhopala* Boisduval 1832

Horsfield (1829) (*Cat. Lep. E.I.C.*, page 87), under " Genus *Thecla* " describes the larva, either as in Pl. 4, figs. 3 and 4 (sub-genus *Amblypodia apidanus* and *helus*), or as in Pl. 4, fig. 2 (*Thecla xenophon*). At the end of page 88 he separates *Amblypodia* from *Thecla* on the basis of the antennae, clubbed in *Thecla*, gradual in *Amblypodia*. After describing the various species of *Thecla* (" strictae sic dicta "), he describes on page 98 Sub-genus *Amblypodia* on the basis of the antennae and the larvae referring to Pl. 4, figs. 3 and 4. He divides the species of *Amblypodia* into 5 sections : No. 1 *narada*. No. 2 *vivarna*. No. 3 *apidanus*, *centaurus*, *helus*, *eumolphus*. No. 4 *sugriva*. No. 5 *vulcanus* etc. On page 111 he says he considers the third section to be typical of the sub-genus *Amblypodia*.

Westwood (1852) (*Gen. Diurn Lep.* **2** : 477) lists the species of *Amblypodia*, placing *Arhopala* as a synonym. He says that the types of the genus are the large Indian *Amblypodias*, *centaurus*, *apidanus*, *helus*, *anthelus* etc. He commences his list of 32 species with Horsfield's section 3, following with sections 1, 2, 4, 5, adding several species not included by Horsfield.

Boisduval (1870) (*Lep. Guatemala* : 14) specifies, without comment, *narada* as the type of *Amblypodia*.

Scudder (1875) (*Proc. Am. Ac. Arts & Sci.* **10** : 108) rejects Boisduval's type selection because of Westwood's previous limitation and he selects *apidanus* as the type.

Moore (1881), Distant (1885), De Nicéville (1890), Bethune-Baker (1903), Bingham (1907) and Swinhoe (1911)—all regarded *narada* as the type of *Amblypodia.*

Riley (1922) (*Entomologist* **55** : 25) pointed out that Horsfield had considered his third section to be typical of his genus and consequently Boisduval's selection of *narada* from the first section was incorrect and that Scudder's selection of *apidanus* must be adopted. He created *Horsfieldia*, type *narada.* Seitz (1926) and Evans (1925 and 1932) followed Riley's lead.

Corbet (1940) (*Proc. R. ent. Soc. Lond.* (B) **9** : 4) wrote—" It is considered that Horsfield's assertion that he considered his third section (comprising *apidanus* Cramer and 3 other species) as typical of his sub-genus *Amblypodia* 1829 does not constitute a type selection, so that the first valid type selection for *Amblypodia* was that by Boisduval (1870), who specified *narada* Hsf. Mr. N. D. Riley is in agreement with this interpretation of the rules of the International Commission for Zoological Nomenclature ". In his subsequent work Corbet used *Arhopala* Boisduval for all the species included in this review.

Corbet is correct in saying that Horsfield made no " type selection ", for under the International Rules of Zoological Nomenclature as they currently exist and are interpreted, since Horsfield did not specify any *single* species as typical of his *Amblypodia*, any subsequent author was free to select any one of the five species Horsfield originally included. It is unfortunate in many ways that Boisduval, when selecting a type species in 1870, did not choose one of the two species (*apidanus* and *helus*) which fitted the description of *Amblypodia* so much better than did the other three species, for by doing so, much subsequent argument could have been avoided. However, as things stand, *narada* must be accepted as the type species of *Amblypodia* and the irregular but understandable action taken by Riley in 1922 set aside. The species included in the genus *Amblypodia*, in this sense, are not dealt with in this review and the genus is therefore excluded from consideration. Fortunately the species which first Scudder and later Riley incorrectly selected as they type species of *Amblypodia*, namely *apidanus*, is also the type species of *Flos* Doherty (1889) so the group of species which it typifies is not left without a generic name.

A really unfortunate outcome of my revision of the *Arhopala* group and its sub-division into definable genera, has been the restriction of the exceedingly well-known name *Arhopala* to a small Papuan group of 5 species of which *phryxus* is the type, leaving *Narathura* Moore as the generic name of the great bulk of the species hitherto referred to *Arhopala.*

2. ***Narathura eridanus viola*** Röber

Bethune-Baker (1903) listed on page 46 *Amblypodia viola* Röber as a synonym of *Arhopala padus* Felder. Then on page 51 he describes and figures as a new species *Arhopala viola* Semper (non *viola* Röb.) based on 1 ♂ and 2 ♀ from Mindanao, which Staudinger had sent him for examination. It has been ascertained from Dr. E. M. Hering of the Berlin Museum that the specimens were destroyed in the war. The figures do not agree very well with the few specimens in the B.M. over the label sub-sp. *dilutior* Staudinger from the Philippines, but until more material becomes available, the coining of a name does not seem necessary.

3. Identity of ***Arhopala kounga*** Bethune Baker

The ♂ and ♀ of this species were described and figured by Bethune-Baker in 1896 as from Borneo. In 1903 he placed *kounga* ♀ as a synonym of *azinis* De Nicéville and remarked that *kounga* ♂ " is a curious form of *aroa* ", in dealing with which species he makes no mention of *kounga.* Corbet (1941) used the name *kounga* for the ♂ described by Bethune-Baker and created a number of sub-species, beginning with *ralanda* from Burma.

It is considered Bethune-Baker's 1903 action restricted *kounga* to the ♀ and the name is used in this review for the Bornean sub-species of *azinis*. *ralanda* replaces *kounga* as the specific name for Corbet's " *kounga* " series, whereof the Bornean sub-species (*kounga* of Corbet nec Bethune-Baker) is *ridleyi* Corbet.

4. Identity of *Amblypodia atrax*

Hewitson (1862) (*Cat. Lyc. B.M.* : 13) described *atrax* ♂ and ♀ from India in coll. B.M. He figured the ♀ and remarked that the ♂ might belong to a different species. The ♂ is labelled " E. Indies " and the ♀ " Bengal ". The ♂ (recte *aida* De Nicéville) occurs only from mid-Burma to Malaya and Indo-China. The ♀ (recte *atrax*) is a common species of the plains of India, extending to mid-Burma.

Moore (1865) (*P.Z. S.* : 774) records *atrax* from Calcutta and thus became the first selector. In 1884 he cites *atrax* (quoting Hewitson's figure), as the type of his genus *Satadra*.

De Nicéville (1889) describes *aida* from mid-Burma and figures the ♂, which = the B.M. specimen of Hewitson's ♂ *atrax*. In 1890 he follows Moore in using *atrax* for Hewitson's ♀ and remarks that Hewitson had undoubtedly mixed up 2 species. In 1891 he described and figured ♂ and ♀ *alemon* from N. Burma : the ♂ is a specimen of *atrax*, while the "♀" is a ♂ of the species described as *alax* by Evans (1932).

Bethune-Baker (1903), wrongly over-riding the principle of the first selector, insists that Hewitson's ♂ must be taken as the type of *atrax* and he describes the species represented by Hewitson's ♀ *atrax* as *hewitsoni*. He considers *aida* to be a strongly marked form of his *mindanensis* and *alemon* he thinks comes near to his *hewitsoni*, replacing it in certain districts of Burma.

Swinhoe (1910) (*Lep. Ind.*) followed Bethune-Baker, describing and figuring as different species, *aida*, *atrax*, *alemon*, *mindanensis* and *hewitsoni* : his figure for the ♀ of *alemon* is correct.

Evans (1925) (*Identification Ind. Butt.*) followed Bethune-Baker, but put *aida* and *mindanensis* as synonyms of *atrax*. In 1932 (2nd edition) he put *hewitsoni* as synonym of *alemon* and described *alax* as the species taken by De Nicéville to be the ♀ of his *alemon*.

Corbet (1941) generally followed Bethune-Baker, putting *aida* as a synonym of *atrax*, *mindanensis* as a synonym of *rafflesi* and *hewitsoni* as a synonym of *alemon*.

It is considered that Bethune-Baker was wrong in over-riding Moore's selection of Hewitson's ♀ as the type of *atrax*. An attempt has been made in this review to straighten out the tangle by regarding *atrax* (= *alemon* and *hewitsoni*), *alax*, *mindanensis* and *aida* as species.

5. Identity of *Arhopala pseudomuta* Staudinger

Distant (1885) (*Rhop. Malay.*) described and figured a species he called *Narathura amphimuta* Felder.

Staudinger (1889) correctly pointed out that Distant's species was not the *amphimuta* of Felder and he renamed it *pseudomuta*.

De Nicéville (1890), in ignorance of Staudinger's action, acted similarly, calling Distant's species *rafflesii*. In 1895 he sunk his name to Staudinger's *pseudomuta*.

Bethune-Baker (1903) stated that *pseudomuta* is quite a distinct species from *rafflesii* and he figures what he calls *pseudomuta*.

Swinhoe and Corbet follow Bethune-Baker.

Bethune-Baker's figure of *Paeudomuta* portrays a species entirely different from that figured by Distant and is here renamed *delta* (A21). *rafflesii* is correctly placed as a synonym of *pseudomuta*.

6. Identity of *Papilio centaurus*

Fabricius (1775) described this species as blue with a fuscous edge : from New Holland : in Mus. Banks.

Horsfield (1829) (*Cat. Lep. E.I.C.* **2** : 102) recorded *centaurus* from Java and stated that the type was in Mus. Banks.

Doubleday (1847) (*List Lep. B.M.* **2** : 24) recorded *centaurus* from Queensland and created *pseudocentaurus* for the *centaurus* of Horsfield from Java etc. Westwood (1852) (*Gen. Diurn. Lep.* **2** : 478) follows suit.

Horsfield & Moore (1857) (*Cat. Lep. E. I.C.* : 40) record *centaurus* from Sikkim, Assam and *pseudocentaurus* from Java.

Felder (1860) (*Wiener Ent. Monat.* **4** : 395) creates *nakula* for the Sumatran and Malaccan form of *centaurus* from the Indian continent.

Butler (1869) (*Cat. Lep. Fab. in B.M.* : 179) states that the type of *centaurus* is in the Banks Collection and that it agrees with Felder's figure in the *Reise Novara* of his *nakula*. This determination was accepted by all authors.

Corbet (1941) (*Proc. R. ent. Soc. Lond.* (B) **10** : 100) stated that " The specimen in the Banks Collection, which has hitherto been regarded as the type of *centaurus* is one of 2 males (without locality labels) which agree with Felder's *nakula*, were probably obtained by Koenig in Malaya and there is every reason for supposing that neither specimen was in the Banks Collection when Fabricius described *centaurus*. Moreover, the original description applies to a ♀. The original description fits best the ♀ of *Arhopala eupolis* Miskin and it is a reasonable assumption that the type was obtained by Banks in N. Queensland ".

It is incorrect to say that Felder's description must apply to a ♀ and there is no evidence to support the assumption that the specimens now in the Banks Collection were not those seen by Fabricius. Many of the localities recorded in the early part of the last century have been found to be incorrect. Apart from Doubleday, who makes no mention of the Banksian specimens, all authors have regarded *centaurus* as coming from the Oriental region and all entomologists whom I have consulted, agree that there is no justification for any departure from the conclusions reached by Butler in 1869.

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Nilasera, *A*
nobilior, *G1*
nobilis, *G1*
norda, *B13*
novaeguineae, *H12*

oberthüri, *I10*
obina, *H12*
obscurata, *E1*
ocrida, *I8*
oenea, *F17*
oenotria, *A18*
oghatina, *C2*
olinda, *F20*
onetor, *H2*
opalina, *A15*
ophiala, *C2*
ophir, *F25*
ormistoni, *I3*
oryuzana, *O5*
overdijkinki, *G21*
ovomaculata, *B24*
ozana, *A17*

padus, *A4*
pagaiensis, *B16*
pagia, *I1*
palawanus, *P11*
pallida, *A18*
Panchala, *O*
pandora, *A22*
pangeran, *A18*
panta, *F21*
panthera, *A13*
paralea, *I5*
paraganesa, *O3*
paramuta, *J1*
pardenas, *F21*
pastorella, *B16*
patuna, *P10*
penanga, *I2*
pendleburyi, *A12*
periander, *H9*
perimuta, *K1*
perissa, *I16*
phaenops, *F15*
phalaerus, *E1*
phalakron, *P11*

phanda, *F*14
philander, *H*10
philippa, *B*11
philtron, *H*2
phryxus, *N*1
pirama, *H*1
pirithous, *H*1
plateni, *F*6
polita, *A*4
potidaea, *N*1
prasiä, *L*4
pratinas, *G*13
pratti, *H*10
pryeri, *F*13
psama, *F*21
pseudo-centaurus, *H*1
pseudomuta, *F*27
purpura, *G*6

quadra, *B*15
querceti, *J*3
quercoides, *F*1

rafflesii, *F*27
rajah, *M*2
ralanda, *F*12
rama, *J*3
ramosa, *J*3
regia, *F*2
regia, *K*1
regina, *K*1
restricta, *G*18
ribbei, *H*12
ridleyi, *F*12
rileyi, *G*18
riuna, *H*12
roona, *I*14

sacharja, *I*9
salvia, *A*2
sandakani, *F*15
sangira, *D*4
sanherib, *G*16
santa, *L*4
santava, *B*4
sarawaca, *O*8
Satadra, *A*
saturata, *P*11
saturatior, *A*1
sceva, *B*6
sebonga, *A*14
selta, *F*11
selymbria, *H*12
seminigra, *O*1
semperi, *A*13
serpa, *G*14
shelfordi, *B*2
siabra, *B*8
siberuta, *I*6
sidicina, *P*13
silhetensis, *F*5
similis, *B*25
simonea, *A*3
singhapura, *P*2
singla, *G*12
sintanga, *F*22
siroes, *G*16
soda, *G*3
sophax, *N*1
sophilus, *E*1
sophrosyne, *H*15
sosias, *L*4
sostrata, *F*2
sotades, *A*1
soter, *A*18
sphendale, *A*15
sphetys, *A*18
staudingeri, *G*17
stinga, *M*3
strophe, *N*5
stymphelus, *E*1
styx, *H*7
subfasciata, *A*3
subfasciata, *L*4
sublustris, *F*14
sudesta, *L*2
suedas, *K*2
suffusa, *A*22
superba, *H*12

tagore, *G*15
talauta, *H*2
tameanga, *G*20
tamyrus, *N*1
tana, *K*6
tebäensis, *H*12
teesta, *G*13
telephus, *E*1
tembaga, *M*1
tenea, *P*2
tephlis, *G*9
termerion, *F*15
teuthrone, *N*1
thamyras, *N*1
theba, *D*1
tifata, *P*2
timana, *K*6
tindali, *H*2
tounguva, *I*18
triangularis, *P*5
trima, *B*4
trionoea, *A*6
tristis, *A*9
trogon, *M*2
tropaea, *B*4
turbata, *G*13
tyrannus, *E*1

uchidae, *O*5
udapa, *A*23
unda, *G*21

valika, *F*21
vandenberghi, *F*6
varro, *A*11
vaya, *P*7
vellanus, *G*14
verelius, *H*2
viardi, *P*1
vihara, *I*1
viola, *A*4
violacea, *J*3
viribus, *P*11
viridissima, *G*16
viviana, *F*21

waigeoensis, *L*2
wallacei, *B*4
wanda, *H*5
waterstradti, *B*4
watsoni, *O*1
weelii, *O*2
whiteheadi, *I*6
wildei, *G*3
wildeyana, *I*11
wilemani, *F*4
wimberleyi, *I*9
woodii, *I*2

xenon, *B*10
xisuthrus, *P*11

yajuna, *B*16
yendava, *A*18

zalinda, *G*13
zambra, *F*6
zelea, *N*1
zephyretta, *O*3
zeta, *I*14
zilana, *P*2
zilensis, *F*23
zohar, *P*2
zylda, *B*18

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A REVISION OF THE *BRÜELIA* (MALLOPHAGA) SPECIES INFESTING THE CORVIDAE

PART II

M. ATIQUR RAHMAN ANSARI

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ENTOMOLOGY Vol. 5 No. 4
LONDON : 1957

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Pp. 143–182 ; 122 *Text-figures*

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A REVISION OF THE *BRÜELIA* (MALLOPHAGA) SPECIES INFESTING THE CORVIDAE

PART II*

By M. ATIQUR RAHMAN ANSARI, M.Sc., Ph.D., D.Sc.

THE various species of *Brüelia* Kéler, 1936 from the crows, belonging to the genus *Corvus*, closely resemble each other in their external morphology and have usually been wrongly identified. Among these species there are three distinct groups separated by the characters of the male genitalia ; a combination of characters including the shape of the head and abdominal chaetotaxy enables these groups to be further subdivided into convenient subgroups.

In the female, the shape of the head, tergal and genital plates are also found useful in separating species.

Three species viz., *Brüelia bipunctata* (Rudow), *B. latifasciata* (Piaget) and *B. rotundata* (Osborn) are included in the present communication as valid names not because we believe them to be so, but because in the absence of the sex, other than from which these are described, we are uncertain of their true status. During these studies we have generally observed that the allied forms are commonly indistinguishable from each other in the females though easily separated in the males. We hesitate therefore to establish a name based on females alone. In order to elucidate this problem, as to whether these names refer to any other known species or not, we think that it is necessary to have collections from the type host and type locality. Before this purpose is achieved, these names are better considered as tentative.

Brüelia argula (Burmeister), 1838

(Text-figs. 1–8, 60–64)

Nirmus argula Burmeister, 1838, *Handb. Ent.* **2** : 430.

Type host : *Corvus c. corax* Linn.

MALE. Head broader than long and roughly hexagonal in shape. Pre-antennal region triangular, parabolic with slightly flattened anterior margin. Marginal carina entire dorsally and feebly sclerotized medianly. Ventral carina uniformly sclerotized throughout and continuous with the marginal carina. Preocular nodus well developed, continuous with the pre-antennal nodus. Postocular nodus well pigmented. The number and arrangement of setae of head as described by Clay

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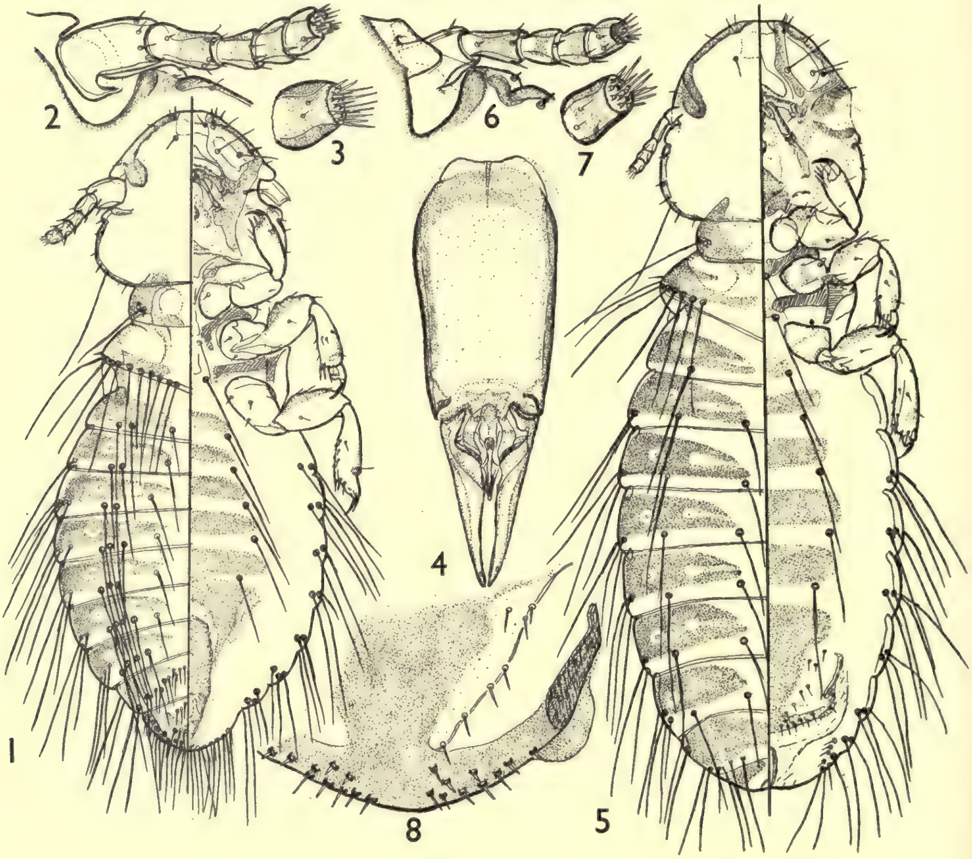
* Part I appeared in *Bull. Brit. Mus.* (*Nat. Hist.*) *Ent.* **4** (8) : 371–406, 1956.

(1951). Antennae exhibiting sexual dimorphism, basal segment robust, about 1·5 times as long as in the female.

Prothorax transverse, with a long dorsal hair in the posterior angle. Pterothorax trapezoidal, laterally divergent. Angulate posteriorly, with 8–9 elongate hairs on the dorsal posterior margin on each side.



FIGS. 1–8.—*Brüelia argula* (Burmeister). (1) Dorsal and ventral aspects of adult male; (2) antenna of male; (3) tip of the same; (4) male genital armature; (5) dorsal and ventral aspects of adult female; (6) antenna of female; (7) tip of the same; (8) vulvar chaetotaxy.

Abdomen elliptical with broadly rounded terminal segment. Tergal plates well developed, II–VI roughly rectangular, narrow; VII–VIII tending to be triangular; IX triangular. Sternal plates II–VI well formed, rectangular, narrowed in the middle. Genital plate triangular. Chaetotaxy as shown in the table below, fairly regular in all specimens save some of the small hairs which vary slightly in some specimens.

GENITALIA. Basal plate is about 1·3–1·4 times as long as the parameres. Mesosomal plate wide anteriorly, concave laterally in the middle and elongated posteriorly.

The details of the proximal head of parameres, shape of endomeres and telomeres and details of mesosome are of specific value and are shown in the figure.

FEMALE. Similar to male but larger and with scarce tergal chaetotaxy. Tergal plates II–VIII approximate, roughly rectangular; IX entire. Genital blotch triangular with posterior angle prolonged backwards to meet a narrow cross-piece forming an anchor-shaped plate. Vulva with 9–10 spines.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	8–9+8–9	1+1	—	7–8+7–8	1+1	—
Abdomen II	2+1+1+2	1+1	0—0	1+1+1+1	1+1	0+0
III	2+1+1+2	1+1	1–2+1–2	1+1+1+1	1+1	1+2
IV	2+1+1+2	1+1	3+3	1+1+1+1	1+1	3+3
V	2–3+1+1+3	1+1	3+3	1+1+1+1	1+1	3+3
VI	2–3+1+1+3	1–2+1–2	3+3	1+1+1+1	1+1	4+4
VII	3+1+1+3	0+0	3+3	1+1+1+1	0+0	3+3
VIII	3+1+1+3	0+0	4+4	2+1+1+2	0+0	4+4
IX	1+9+9+1	0+0	5+5	4+4	0+0	4+4
X–XI	3+3 3+3	— —	23+18	—	Vulva : 9+10	—

Measurements (mm.) (Length × Breadth)

	Male (neotype)	Female (neallotype)
Head : pre-antennal	0·164 × 0·397	0·205 × 0·452
hind head	0·267 × 0·479	0·288 × 0·527
Prothorax	0·103 × 0·315	0·103 × 0·328
Pterothorax	0·157 × 0·465	0·205 × 0·521
Abdomen	0·924 × 0·698	1·212 × 0·716
L : B of pre-antennal	1 : 2·42	1 : 2·21
L : B of hind head	1 : 1·79	1 : 1·83
Cephalic index	1 : 1·11	1 : 1·07

MATERIAL EXAMINED. Six males and 7 females from *Corvus corax corax* Linn. from Uist and Russia in British Museum (Nat. Hist.) Collection.

Neotype (male) of *Brüelia argula* (Burmeister) and *neallotype* (female) on slide no. 14562 in Meinertzhagen collection (British Museum) (Nat. Hist.) from *Corvus corax corax* Linn. *Neoparatypes :* 5 males and 6 females from the same host (data above).

Fifty-four males and 74 females from *Corvus corax laurencei* Hume from Chorband and Kabul (Afghanistan), Palestine and Lyallpur (Pakistan), 20 males and 6 females from *Corvus corax ruficollis* and 5 males and 74 females from *Corvus corax tingitanus* from Egypt, Morocco, North Africa and Teneriffe in Meinertzhagen collection were found to be indistinguishable from *Brüelia argula*.

Brüelia leucocephalus (Nitzsch), 1866

(Text-figs. 9, 26–27, 65–68)

Nirmus leucocephalus, Nitzsch, 1866, *Z. ges. Natwiss.* **28** : 365.

Type host : *Corvus albicollis* Latham.

Brüelia leucocephalus is closely allied to *B. argula* from which it differs in the abdominal chaetotaxy. From the other allied forms viz., *B. quadrangularis* and *B. theresae* it differs in the shape of the head.

MALE. Head broader than long ; pre-antennal region less than half the region behind. Marginal carina entire. Dorsal suture well marked. Antennae well built, basal segment robust. Tergal plates II–IX narrow, approximate, well sclerotized ; III–VI ensiform with two clear, or faintly pigmented circular areas. Sternal plates II–VI well formed. Genital plate triangular. Genitalia of the type found in *Brüelia argula*. Basal plate broader anteriorly and narrow posteriorly. Parameres slightly longer and broader than in *B. quandrangularis*. The characters of the proximal head of parameres, endomeres and mesosome are also different.

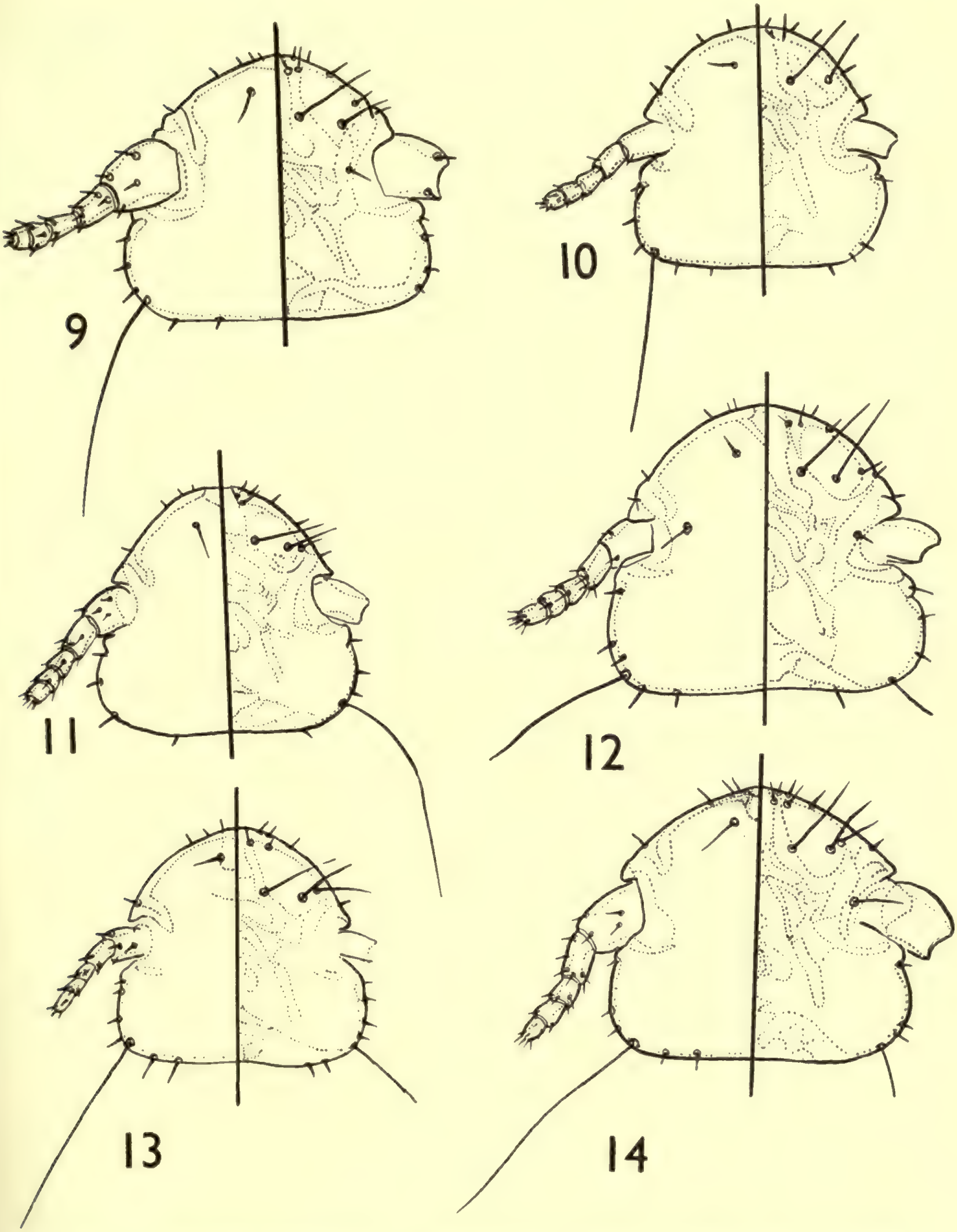
FEMALE. Similar to male but the measurements are greater. The abdominal chaetotaxy also differs considerably.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Ptero-thorax .	11+10–11	1+1	—	9+9	1+1	—
Abdomen :						
II .	2+3+3+2	1+1	0+0	1+2+2–3+1	1+1	0+0
III .	2+4+3–4+2	1+1+1+1	1+2	2+3+3+2	3+4	2+2
IV .	2+3–4+4+2	1+1+1+1	2+3	2+3+3+2	3+3	2+3
V .	2+4+4+2	1+1+1+1	3+3	2+2–3+3+1–2	3+3–4	3+3
VI .	2+3+3+2	1+1+1+1	4+4	1–2+3+3+1–2	3+4	4+4
VII .	2+3–4+3–4+2	0+0	3+3	2+2+2+1–2	1+1	3–4+3
VIII .	4+2+2+4	0+0	5+5	2+3+3+1–2	0+0	4–5+4–5
IX .	1+16+17+1	0+0	4+4	4+4	0+0	5+5
X–XI .	3+3 4+3	7+7	31–33+31–35	—	Vulva : 12+12–16 See Text-fig.	—

Measurements (mm.)

	Male (neotype)	Female (neallotype)
Head : pre-antennal .	0·137 × 0·349	0·184 × 0·424
hind head .	0·308 × 0·514	0·294 × 0·521
Prothorax . . .	0·144 × 0·356	0·131 × 0·342
Pterothorax . . .	0·177 × 0·554	0·171 × 0·500
Abdomen . . .	1·014 × 0·684	1·233 × 0·718
L : B of pre-antennal .	1 : 2·54	1 : 2·31
L : B of hind head .	1 : 1·67	1 : 1·77
Cephalic index . .	1 : 1·13	1 : 1·09



FIGS. 9–14. Heads of adult males : (9) *Brüelia lecocephalus* (Nitzsch) ; (10) *Brüelia theresae*, sp. nov. ; (11) *Brüelia quadrangularis* (Rudow) ; (12) *Brüelia tasniemae* sp. nov. ; (13) *Brüelia variegata* sp. nov. ; (14) *Brüelia afzali* sp. nov.

Material examined. Twelve males and 20 females from *Corvus albicollis* Latham, from Basutoland, Tanganyika, Kenya, South Nigeria and Uganda.

Neotype (male) and *neallotype* (female) from *Corvus albicollis* from Basutoland, Swedish South African Expedition 1950–51. *Neoparatypes:* 11 males and 19 females from the same host species (data above).

Brüelia theresae sp. nov.

(Text-figs. 10, 28–29, 69–73)

This species resembles *Brüelia argula* (Burmeister) in all general details, but there is considerable difference in the abdominal chaetotaxy of both sexes. The male genitalia also differ in the details of the proximal head of the parameres. The shape of the endomeres and telomeres and details of mesosome are similar to that found in *Brüelia argula*.

Abdominal Chaetotaxy

	Male (holotype)			Female (allotype)		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	9+9	1+1	—	8+7	1+1	0+0
Abdomen:						
II	2+3+3+2	1+1	0+0	1+3+3+1	1+1	1+2
III	2+3+3+2	1+1	1+1	1+2+3+1	1+1+1+1	2+2
IV	2+3+3+2	1+1	2+2	1+2+2+1	1+1+1+1	2+2
V	2+2+3+2	1+1	2+2	1+2+2+1	1+1+1+1	2+3
VI	2+2+2+2	1+1	3+3	1+1+1+1	1+1+1+1	2+3
VII	2+2+3+2	0+0	2+3	1+1+1+1	0+0	2+3
VIII	6+5	0+0	3+3	1+1	0+0	4+4
IX	1+8+8+1	0+0	3+3	2+2	0+0	—
X–XI	3+3	3+3	23+22	—	Vulva: 9+10	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head: pre-antennal	0·157×0·349	0·184×0·383
hind head	0·253×0·417	0·253×0·452
Prothorax	0·103×0·281	0·103×0·288
Pterothorax	0·151×0·431	0·151×0·452
Abdomen	0·897×0·547	1·027×0·582
L : B of pre-antennal	1 : 2·22	1 : 2·08
L : B of hind head	1 : 1·64	1 : 1·78
Cephalic index	1 : 1·02	1 : 1·03

Material examined. Eighteen males and 29 females from *Corvus rhipidurus* from Aden. *Holotype* (male) and *allotype* (female), slide no. 17849 in Meinertzhagen collection (British Museum (Nat. Hist.)) from *Corvus rhipidurus* Hartest from Aden. *Paratypes:* 17 males and 28 females from the type host (data above).

Brüelia quadrangularis (Rudow), 1869

(Text-figs. 11, 30–31)

Nirmus quadrangularis Rudow, 1869, *Beitr. Kenntn. Malloph.* : **18**.

Type host : *Corvus albus* Müller.

Brüelia quandrangularis is allied to *B. argula*, from which it differs in chaetotaxy. It differs from *B. theresae* and *B. leucocephalus* in the shape of the head.

Rudow described two species of *Nirmus* from *Corvus scapulatus* (= *Corvus albus* Müller). Hopkins & Clay (unpublished records) have pointed out that the earlier description (1869, p. 18, *B. quadrangularis*) fits the broad-headedform while the other (1870, p. 467, *bipunctata*) fits the narrow-headed form. In the British Museum collection both of these forms from the type host are represented, but the broad-headed forms were found to predominate.

MALE. Head broad, pre-antennal region almost as long as the postantennal region. Marginal carina entire, medianly less sclerotized and concave. Dorsal suture present. Ventral carina fused with the ventrally interrupted marginal carina. Temporal carinae well formed.

Abdomen with narrow tergal plates on segments II–IX. Sternal plates II–VI well formed, rectangular. Genital plate triangular, occupying segments VI–IX.

Genitalia as in *B. argula*.

FEMALE. Similar to the male in general body markings. Tergal plate IX entire. There is, however, considerable difference in abdominal chaetotaxy.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	9–10+9	1+1	—	7+8	1+1	—
Abdomen :						
II	2+3+3+2	1+1	0+0	1+3+2–3+1	1–2+1–2	0+0
III	2+3+2–3+2	1+1+1+1	2+2	1+1+2+1–2	1–2+1–2	2+2
IV	2+3+3+2	1+1+1+1	2+2	1+2–3+2–3+1	2–3+2–3	2+2
V	2+3+2–3+2	1+1+1+1	3+3	1+2–3+2–3+1	2+2	2–3+3
VI	2+4+3+3	1+2+2+1	3+3	1+1–2+1–2+1	2+2	3+3
VII	2+2–3+3+2	0+0	3+3	1+1+1+1	0+0	3+3
VIII	3+3+3+2	0+0	3+3	1+1	0+0	3+4
IX	1+14+16+1	0+0	4+4	3+4	0+0	4+3
X–XI	3+3	5+5–6	18–20+22	—	Vulva : 10–11+12–14	—

Measurements (mm.)

	Male (neotype)	Female (neallotype)
Head : pre-antennal	0·164×0·335	0·205×0·383
hind head	0·261×0·438	0·253×0·459
Prothorax	0·116×0·308	0·109×0·308
Pterothorax	0·137×0·459	0·157×0·459
Abdomen	0·807×0·616	0·938×0·586
L : B of pre-antennal	1 : 2·04	1 : 1·87
L : B of hind head	1 : 1·68	1 : 1·81
Cephalic index	1 : 1·03	1 : 1·00

Material examined. Ten males and 22 females from the type host, *Corvus albus* Müller from Kenya, Tanganyika, Sudan, South West Africa.

Neotype (male) and *neallotype* (female) from *Corvus albus* Müller from South West Africa on slide no. 19180–91 in Meinertzhagen collection (British Museum (Nat. Hist.)). *Neoparatypes :* 9 males and 21 females from the type host (data above.)

Fourteen males and 17 females from *Corvus corax edithae* from Somaliland (two localities) are indistinguishable from the above specimens.

Brüelia tasniemae sp. nov.

(Text-figs. 12, 32–33, 74–78)

This species resembles *Brüelia uncinosa* (Burmeister) in the shape of the head, from which it can be easily distinguished by the tergal plates. From the other allied forms it differs in the shape of the head, in the development of the marginal carina and ventral carina.

Male. Fore head rounded. Marginal carina narrow, entire, although less heavily sclerotized in front and indented so as to leave a hyaline margin at this point. Preocular nodus well pigmented. Postocular nodus well developed but not well pigmented. Ventral carina well formed, pigmented in the anterior portion alone. Tergal plates triangular, III–VII with medianly depressed anterior and posterior margins and two circular clear spaces. Genitalia as shown in the figure, similar to that found in *B. argula*, but differ in the shape of the mesosomal plate. The genitalia are also like those found in *B. uncinosa*. The latter species can be easily separated by the pattern of the tergal plates.

Female. Similar to the male, but differs in size of the body, tergal plates and abdominal chaetotaxy. Tergal plates rectangular, with anterior ends opening like a beak.

Abdominal Chaetotaxy

		Male (holotype)			Female (allotype)		
		Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax		9+7	1+1	—	9+7	1+1	—
Abdomen	II	1+1	1+1	0+0	1+1	1+1	0+0
	III	1+1+1+1	1+1	1+1	1+1+1+1	1+1	1+1
	IV	2+1+1+2	2+3	3+2	1+1+1+1	1+1	2+2
	V	2+2+2+2	2+2	2+2	1+1+1+1	2+2	2+2
	VI	2+3+3+2	2+2	2+3	1+1+1+1	2+2	3+3
	VII	2+3+3+2	0+0	2+2	1+1+1+1	0+0	3+3
	VIII	3+2+2+3	0+0	4+4	1+1+1+1	0+0	4+4
	IX	1+8+9+1	0+0	4+4	3+3	0+0	4+4
	X–XI	3+3	—	15+15	—	Vulvae : 13+12	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head: pre-antennal	0·184×0·424	0·219×0·486
hind head	0·281×0·521	0·294×0·561
Prothorax	0·096×0·328	0·109×0·349
Pterothorax	0·226×0·534	0·226×0·534
Abdomen	1·000×0·712	1·356×0·800
L : B of pre-antennal	1 : 2·31	1 : 2·21
L : B of hind head	1 : 1·85	1 : 1·91
Cephalic index	1 : 1·12	1 : 1·09

MATERIAL EXAMINED. Four males and 10 females from *Corvus frugilegus frugilegus* Linn. from Kabul. *Holotype* (male), *allotype* (female) from *Corvus frugilegus frugilegus* Linn. from Kabul on slide no. 9686 in Meinertzhagen collection. *Paratypes:* 3 males and 9 females from the same host (data above).

Brüelia variegata sp. nov.

(Text-figs. 13, 34–35, 79–82)

This species is similar to the above species from which it can be distinguished by the genitalia, and the size and shape of the head, which is rounded in front.

MALE. Marginal carina very narrow, entire, feebly sclerotized and slightly depressed in the middle. Ventral carina not well developed, approximate. Basal antennal segment not so robust as in the allied species. Tertal plates II–VI almost rectangular, with interrupted colourless areas in the middle, VII–IX triangular. Male genitalia as shown in the figures. Parameres comparatively short and robust, with well developed proximal heads.

FEMALE. Similar to the male, but the measurements and chaetotaxy differ and cannot be easily separated from the females of allied forms. Genital plate with almost straight sides so as to form a very obtuse terminal angle.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	7–9+7–9	1+1	—	6–7+6–7	1+1	—
Abdomen:						
II	2+1+1+2	1+1	0+0	1+1	1+1	0+0
III	2+1+1+2	1+1	1+1	1+1+1+1	1+1	1+1
IV	2+1+1+2	1+1	2+2	1+1+1+1	1+1	2–3+2–3
V	2+1–2+1–2+2	1+1	2+3	1+2+1+1	1+1	2–3+2–3
VI	2+1–2+3+2	1+1	3+3	1+2+1+1	1–2+1–2	3+3
VII	2+2+2+2	0+0	3+3	1+1+1+1	0+0	3+3
VIII	1+4+2–5+1	0+0	4+3	1+1+1+1	0+0	3+3
IX	1+6–7+6–7+1	0+0	3+3	3+3	0+0	2+2
X–XI	3+3	0+0	14+15	—	Vulva: 8–10+8	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head: pre-antennal	0·157×0·369	0·177×0·377
hind head	0·239×0·424	0·234×0·452
Prothorax	0·103×0·246	0·109×0·253
Pterothorax	0·137×0·397	0·137×0·391
Abdomen	0·876×0·547	1·131×0·568
L : B of pre-antennal	1 : 2·35	1 : 2·13
L : B of hind head	1 : 1·77	1 : 1·93
Cephalic index	1 : 1·10	1 : 1·10

MATERIAL EXAMINED. Four males and 15 females from *Corvus capensis* from Somaliland, Transvaal, and Damaraland. *Holotype* (male) and *allotype* (female) on slide no. 18329 from *Corvus capensis* Licht. from Somaliland, in the Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes:* 3 males and 14 females from the same host (data above).

Brüelia afzali sp. nov.

(Text-figs. 14, 36–37, 83–87)

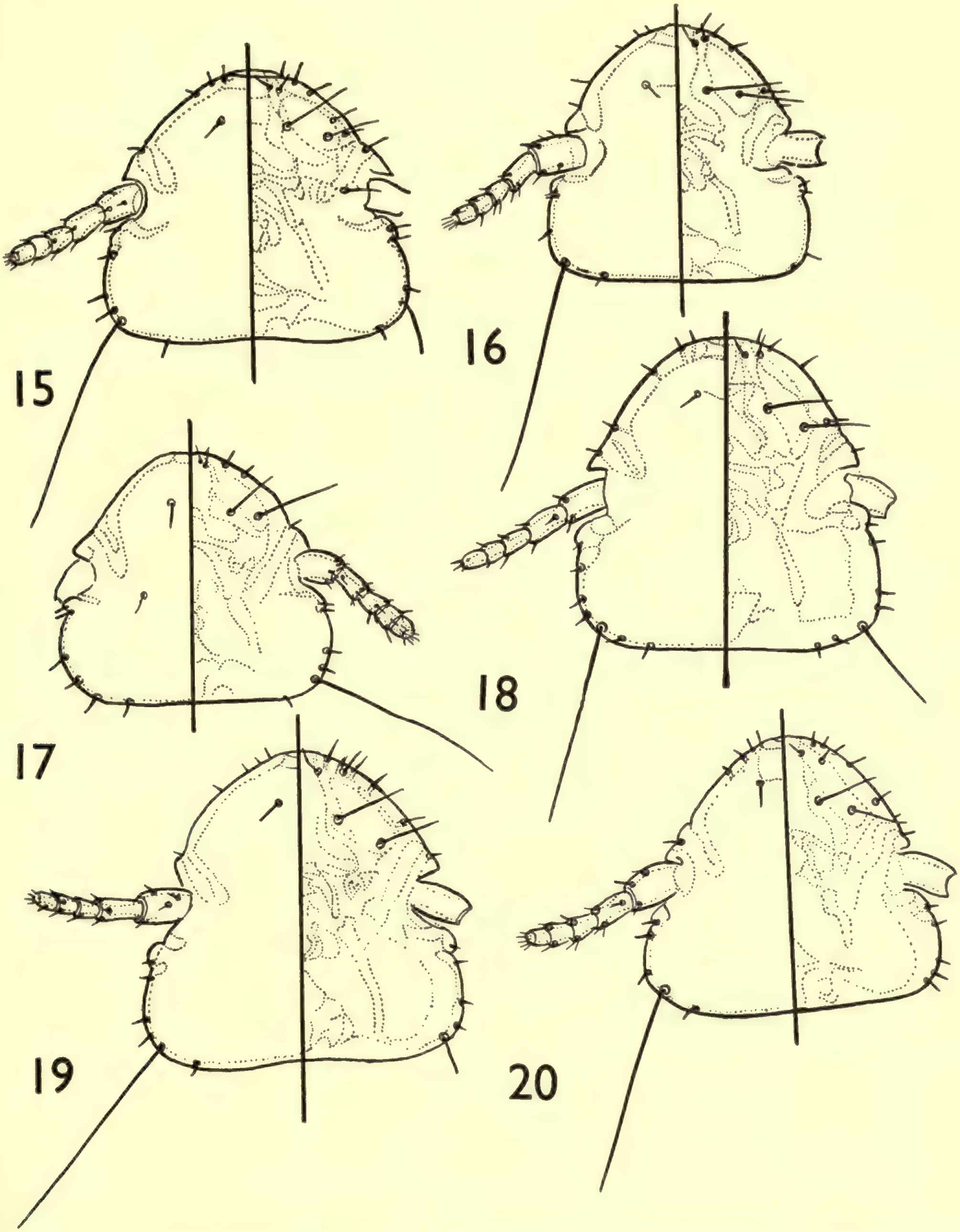
This species resembles *Brüelia leucocephalus* in the shape of the head, and *B. uncinosa* in the form of the male genitalia. From the latter it differs in the shape of tergal plates. It also resembles *B. tasniemae* sp. nov. and *B. variegata* sp. nov. from both of which it is distinguished by the squat and broad fore head and well developed first antennal segment in the male.

MALE. Fore head very squat and broader than long. Marginal carina narrow. Ventral carina well developed. Preocular nodus well pigmented and fused with pre-antennal nodus. Postocular nodus not well pigmented. Antennae well developed, antennal segment I very robust. Tergal plates well developed, II–VI wedge-shaped, VII–IX triangular. Male genitalia of the pattern seen in the species referred to above.

FEMALE. Similar to male. Ventral setae of pleural plate IX elongate.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pteor-thorax	7–9+6–9	1+1	—	9–10+8–10	1+1	—
Abdomen:						
II	3–4+3–4	2+2	0+0	1+3+2+2	2+2	0+0
III	1+4+4–5+1	3–4+3–4	1+1	2+2–3+2–3+1–2	2+3+2+2	0+0
IV	1+3–4+3–4+1	2–3+3–4	2+2	1+2+1–2+1	4+1+1+4	4+3
V	1+4+5+1	3+3	2+2	1+2+2+1	3+4+1+1+3+5	3+3
VI	1+4+4+1	2–3+2–3	3+3	1+2–3+2–3+1	3+1+1+3	4+4
VII	1+4+4+1	0+0	3+3	1+2+1–2+1	2+1	3+4
VIII	1+4+5+1	0+0	4+4	1+1–2+1–2+1	0+0	4+5
IX	6+3+3+7	0+0	4+3	5+9+5+7	0+0	4+5
X–XI	—	—	14+14	—	Vulva: 18–22+16–19	—



FIGS. 15–20. Heads of adult males : (15) *Brüelia uncinosa* (Burmeister) ; (16) *Brüelia saliemi* sp. nov. ; (17) *Brüelia saliemi mollii* ssp. nov. ; (18) *Brüelia atherae* sp. nov. ; (19) *Brüelia cryptoleucus* sp. nov. ; (20) *Brüelia varia* (Burmeister).

Measurements (*mm.*)

	Male (holotype)	Female (allotype)
Head : pre-antennal	0·171×0·445	0·219×0·507
hind head	0·308×0·521	0·308×0·554
Prothorax	0·109×0·335	0·116×0·335
Pterothorax	0·219×0·527	0·239×0·486
Abdomen	0·979×0·726	1·281×0·774
L : B of pre-antennal	1 : 2·30	1 : 2·31
L : B of hind head	1 : 1·69	1 : 1·79
Cephalic index	1 : 1·09	1 : 1·05

MATERIAL EXAMINED. Four males and 6 females from *Corvus cryptoleucus* from Texas and Illinois. *Holotype* (male) and *allotype* (female) from *Corvus cryptoleucus* Couch from Illinois on slide no. 12668 in Meinertzhagen collection. *Paratypes :* 3 males and 5 females from the same host (data above).

Brüelia uncinosa (Burmeister), 1838

(Text-figs. 15, 38–39, 88–91)

Nirmus uncinosa Burmeister, 1838, *Handb. Ent.* **2** : 430.

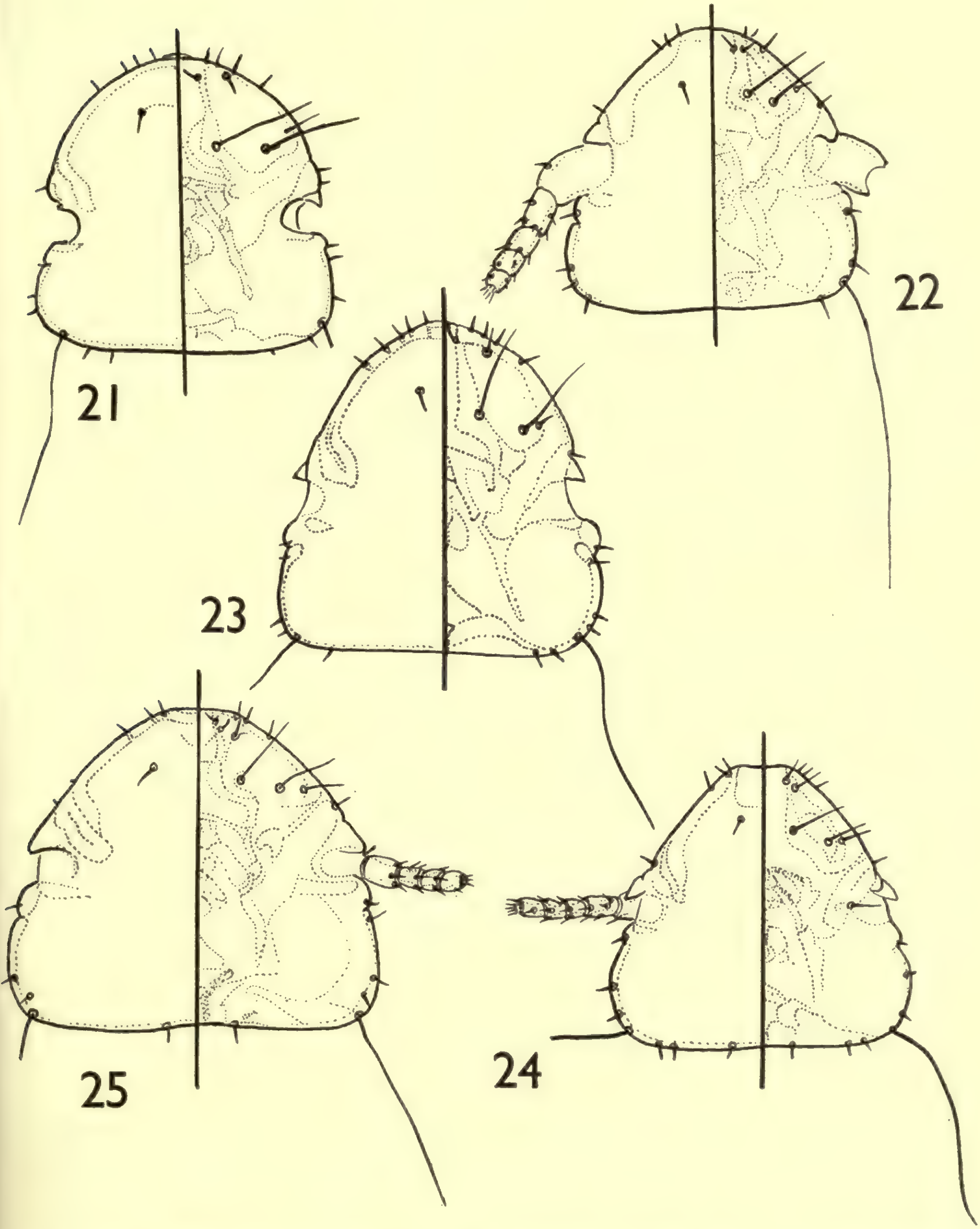
Type host : *Corvus corone cornix* Linn.

MALE. Head broader than long. Marginal carina entire, but faintly sclerotized in the middle. Ventral carina very feebly sclerotized and not well pigmented. Tergal plates II–III lateral, well pigmented near the stigmata, IV–VIII with a posterior pigmented arm so as to form a horizontally-laid sign of interrogation. Sternal plates II–VI transverse. Genital plate well developed. Genitalia as shown in the figure. Proximal head of parameres narrow. Mesosomal plate polygonal, shape of endomeres and telomeres characteristic.

FEMALE. Similar to the male, but differs in measurements and abdominal chaetotaxy.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Ptero-thorax	9–10+9–10	1+1	—	6–9+6–9	2+2	—
Abdomen :						
II	1+1+1+1	2+2	0+0	1+1	1+1	0+0
III	1+1+1+1	2+2	1+1	1+1	1+1	1+1
IV	2+1–2+1–2+2	2+2	2+2	1+1+1+1	2+2	2–3+2
V	3+1–2+1–2+2–3	2–3+2	2–3+2	1+1+1+1	2+2	2–3+2
VI	2–3+2–3+3+2–3	2–3+3	2–3+3	1+1+1+1	1+1	3–4+3
VII	2–3+2–3+2–3+2–3	0+0	3+3	1+1+1+1	0+0	3+3
VIII	2–3+2+2+3	0+0	3–4+4	1+1+1+1	0+0	3–4+3
IX	1+9–12+10–13+1	0+0	4–5+4–5	1+3+3+2	0+0	4–5+4
X–XI	3+3 3+3	0+0	12–16+15–17	—	Vulva : 13–15+15–17	—



FIGS. 21–25. Heads of adult males: (21) *Brüelia nawabi* sp. nov; (22) *Brüelia perwienae* sp. nov. (23–25) Heads of adult females: (23) *Brüelia bipunctata* (Rudow); (24) *Brüelia latifasciata* (Piaget); (25) *Brüelia rotundata* (Osborn).

Measurements (mm.)

	Male (neotype)	Female (neallotype)
Head : pre-antennal	0·199×0·472	0·199×0·509
hind head	0·318×0·582	0·318×0·609
Prothorax	0·127×0·345	0·127×0·345
Pterothorax	0·318×0·545	0·336×0·545
Abdomen	0·882×0·718	1·027×0·782
L : B of pre-antennal	1 : 2·37	1 : 2·55
L : B of hind head	1 : 1·83	1 : 1·91
Cephalic index	1 : 1·12	1 : 1·18

MATERIAL EXAMINED. Forty males and 60 females from *Corvus corone cornix* Linn. from South and North Uist, Norfolk, Mull, Dublin, Estonia and Sweden. *Neotype* (male), *neallotype* (female) from *Corvus corone cornix* Linn. from South Uist, Scotland in Meinertzhagen collection (British Museum (Nat. Hist.)), on slide no. 35. *Neoparatypes :* 39 males and 59 females from the same host (data above).

Eight males and 9 females from *Corvus corone sardonius* Klein. from Egypt, Sardonia, and Palestine are not separable from the above specimens.

Brüelia uncinosa plena subsp. n.

Fifteen males and 44 females from *Corvus corone corone* Linn. from Devon, England were found to differ from typical *uncinosa* in the pattern of the abdominal tergal plates. In those specimens instead of the tergal plates resembling a horizontally-laid sign of interrogation, the hook of the sign in the majority of plates is closed leaving a circular unpigmented area. Apart from this one constant difference no other reliable character could be found to differentiate the two forms, these specimens are, therefore, treated as a subspecies of *uncinosa*.

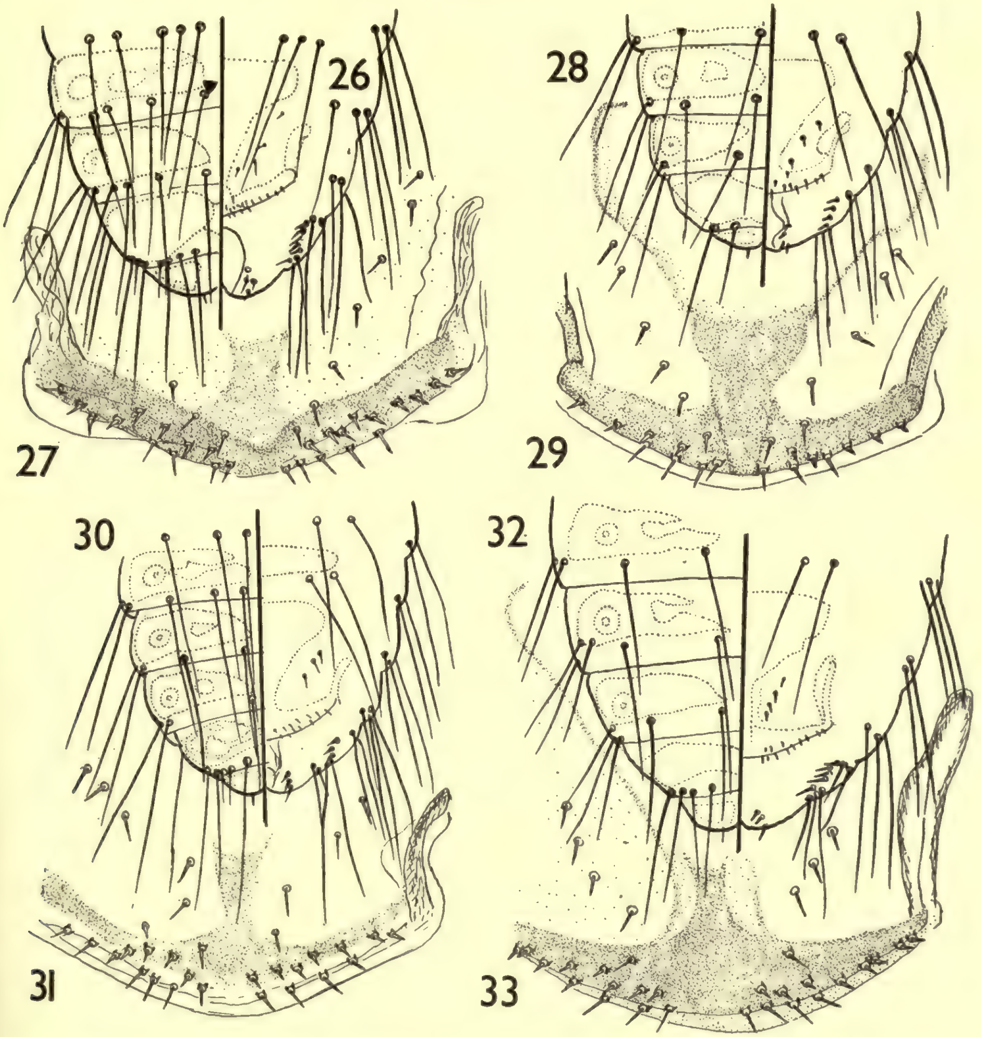
MATERIAL EXAMINED. Fifteen males and 44 females from *Corvus corone corone* from Devon. *Holotype* (male), *allotype* (female) from *Corvus corone corone* Linn. from Devon on slide no. 15262 in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes :* 14 males and 43 females from the same host (data above).

Brüelia saliemi sp. nov.

(Text-figs. 16, 40–41, 92–96)

This species is similar to *Brüelia uncinosa* (Burmeister) from which it can be easily distinguished by the shape of the head, abdominal chaetotaxy and shape of the tergal plates. This species is also allied to *B. saliemi mollii* subsp. nov. from which it can be separated by the tergal plates of the female.

MALE. Head as long as broad. Marginal carina entire dorsally but feebly sclerotized and depressed in the middle. Dorsal suture present, not continued across the head. Ventral carina comparatively less sclerotized and fused to the ends of marginal carina. Tergal plates triangular, approximate, with scooped out areas in the anterior region, while continuously sclerotized posteriorly. Genitalia of the pattern seen in *B. uncinosa* and distinguished by the characters of parameres, endomeres and mesosome. Parameres are short with broader head.



Figs. 26–33. Last abdominal segments and vulvar chaetotaxy of adult females: (26–27) *Brüelia leucocephalus* (Nitzsch); (28–29) *Brüelia theresae* sp. nov.; (30–31) *Brüelia quadrangularis* (Rudow); (32–33) *Brüelia tasniemae* sp. nov.

Female. Similar to the male but tends to be larger. The tergal, sternal and genital plates are different from the allied forms. The abdominal chaetotaxy tends to be scarce in this species.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	8–10+8–9	1+1	—	8+9	1+1	0+0
Abdomen II	1+1+1+1	1+1	0+0	1+1	1+1	0+0
III	1+1+1+1	1+1	0+0	1+1	1+1	2+1
IV	2+1+1+2	1+1	2+2	1+1+1+1	1+1	3–4+3
V	2+1+1+2	1+1	2+2	1+1+1+1	2+1	3–4+3
VI	2+1+1+2	1+1	3+3	1+1+1+1	1+1	4+4
VII	2+1+1+2	0+0	3+2	1+1+1+1	0+0	3+3
VIII	2+2+2+2	0+0	4+4	1+1+1+1	0+0	3–4+3–4
IX	1+7–8+8+1	0+0	3+3	2+3+2+3	0+0	4–5+4
X–XI	3+3	0+0	19–21+18–21	—	Vulva : 11–13+12–14	—

Measurements (*mm.*)

	Male (holotype)	Femal (allotype)
Head : pre-antennal	0·177×0·356	0·233×0·383
hind head	0·253×0·445	0·259×0·479
Prothorax	0·137×0·315	0·116×0·301
Pterothorax	0·226×0·527	0·246×0·501
Abdomen	0·891×0·616	1·164×0·630
L : B of pre-antennal	1 : 2·01	1 : 1·64
L : B of hind head	1 : 1·75	1 : 1·85
Cephalic index	1 : 1·03	1 : 0·97

MATERIAL EXAMINED. Ten males and 28 females from *Corvus splendens* Vieill. from Bihar, Deccan, Lyallpur and Nepal. *Holotype* (male) and *allotype* (female) on slide no. 9313 from *Corvus splendens* in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes :* 9 males and 27 females from the same host (data above).

One male and 3 females from *Corvus splendens zugmeyeri*, from Sind in the British Museum (Nat. Hist.) collection, were found to be indistinguishable from the specimens referred to above.

Brüelia saliemi mollii subsp. nov.

(Text-figs. 17, 42–43, 97–100)

This species is similar to the above species, but is easily distinguished by the tergal plates. Plates II–VIII have circular, colourless stigmatal spots, while in the allied form these plates are open like a beak in the anterior region. In female the tergal plates are triangular and entire.

MALE. Marginal carina well developed, indented in the middle, pigmentation light. Ventral carina well developed; devoid of pigment. Tergal plates II–VI more or less rectangular with two clear circular areas, VII–VIII triangular, IX very narrow and acutely triangular. Genital armature as shown in figures, it is distinguished from allied species by the mesosomal plate.

FEMALE. Similar to the allied species in general characters. Tergal plates rectangular. Genital plate triangular, terminal angle not very acute.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	8–10+8–9	1+1	—	7–9+8–9	1+1	—
Abdomen II	1+1+1+1	1+1	0+0	1+1	1+1	0+0
III	1+1+1+1	1+1	1+1	1+1	1+1	1+1
IV	2+1+1+2	1+1	2–3+1–3	1+1+1+1	1+1	2+2–3
V	2+1+1+2	1+1	2+2–3	1+1+1+1	1+1	2–3+2–3
VI	2+1+1+2	1+1	2–3+2–3	1+1+1+1	1+1	2–3+3–4
VII	2+1+1+2	0+0	3+2–3	1+1+1+1	0+0	2–3+3
VIII	2+1+1+2	0+0	2–3+2–3	1+1	0+0	3–4+3–4
IX	1+5–7+5–10+1	0+0	3+3	3+3	0+0	4+3–4
X–XI	3+3	0+0	15–16+14–18	—	Vulva : 11–15+11–17	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head : pre-antennal	0·177×0·369	0·219×0·431
hind head	0·253×0·465	0·274×0·514
Prothorax	0·103×0·288	0·103×0·321
Pterothorax	0·171×0·479	0·198×0·514
Abdomen	0·821×0·616	0·061×0·596
L : B of pre-antennal	1 : 2·08	1 : 1·96
L : B of hind head	1 : 1·83	1 : 1·87
Cephalic index	1 : 1·08	1 : 1·04

MATERIAL EXAMINED. Five males and 4 females from *Corvus coronoides macrorhynchus* Wagler from Malay Peninsula, 4 males and 11 females from *Corvus c. intermedius* Adams from Bihar (India), 1 male and 5 females from *Corvus c. colonorum* Swinhoe from China, 1 male from *Corvus c. insularis* Heinroth and 2 males from *Corvus c. bennetti* North. *Holotype* (male) and *allotype* (female) from *Corvus coronoides macrorhynchus* Wagler from Malay Peninsula, in Meinertzhagen collection (British Museum (Nat. Hist.)), on slide no. 4022. *Paratypes :* 4 males and 3 females from the same host (data above).

Brüelia atherae sp. nov.

(Text-figs. 18, 44–45, 101–104)

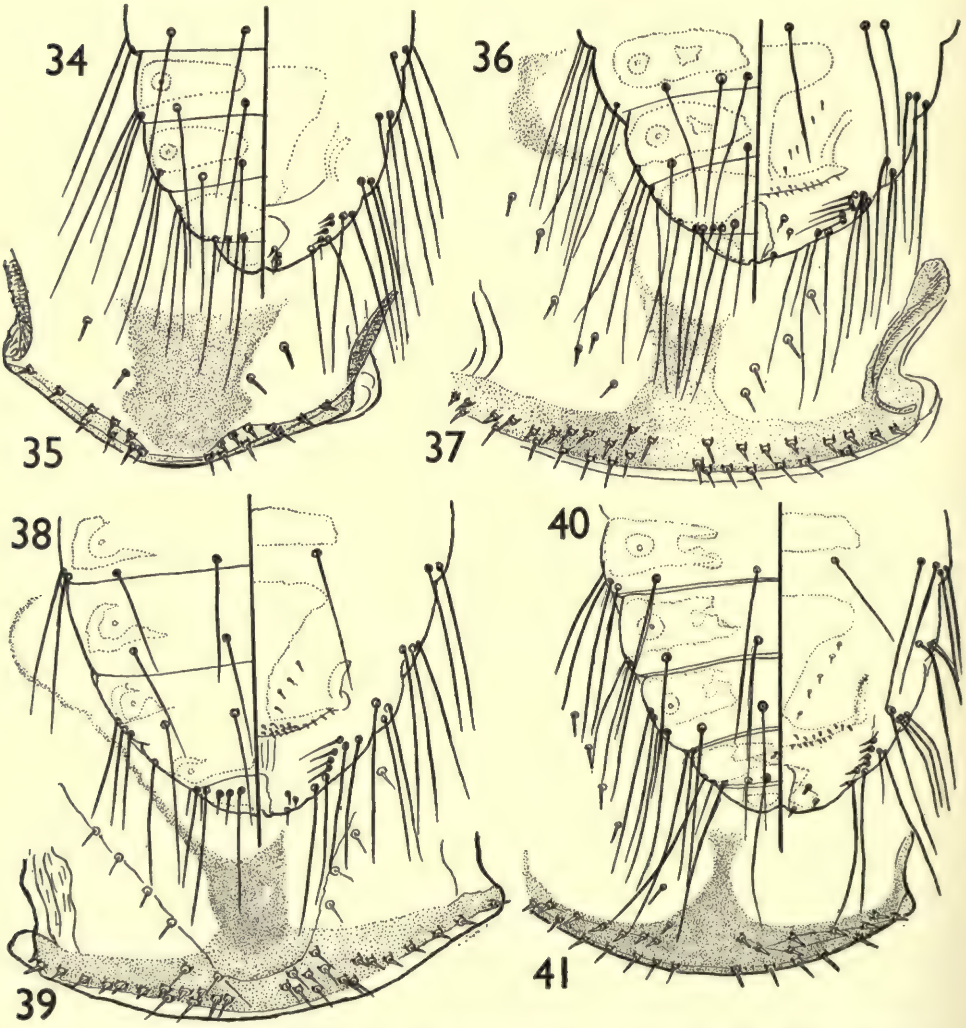
This species is closely allied to *Brüelia varia* from which it can be distinguished by the shape of the head and tergal plates. The male genitalia exhibit characteristic mesosomal characters.

MALE. Marginal carina entire, backwardly hanging to form a concave hyaline margin in the middle. Preocular and postocular nodus well developed. Ventral carina sclerotized only proximally. Tergal plates II–IX approximate, III–IX triangular with one circular and irregular clear area. Sternal plates III–VI well formed. Genital armature of the type found in *B. varia*, but differs in details of proximal heads of the parameres. Mesosomal plates as shown in the figure.

FEMALE. Similar to the male except for abdominal chaetotaxy.

Measurements (mm.)

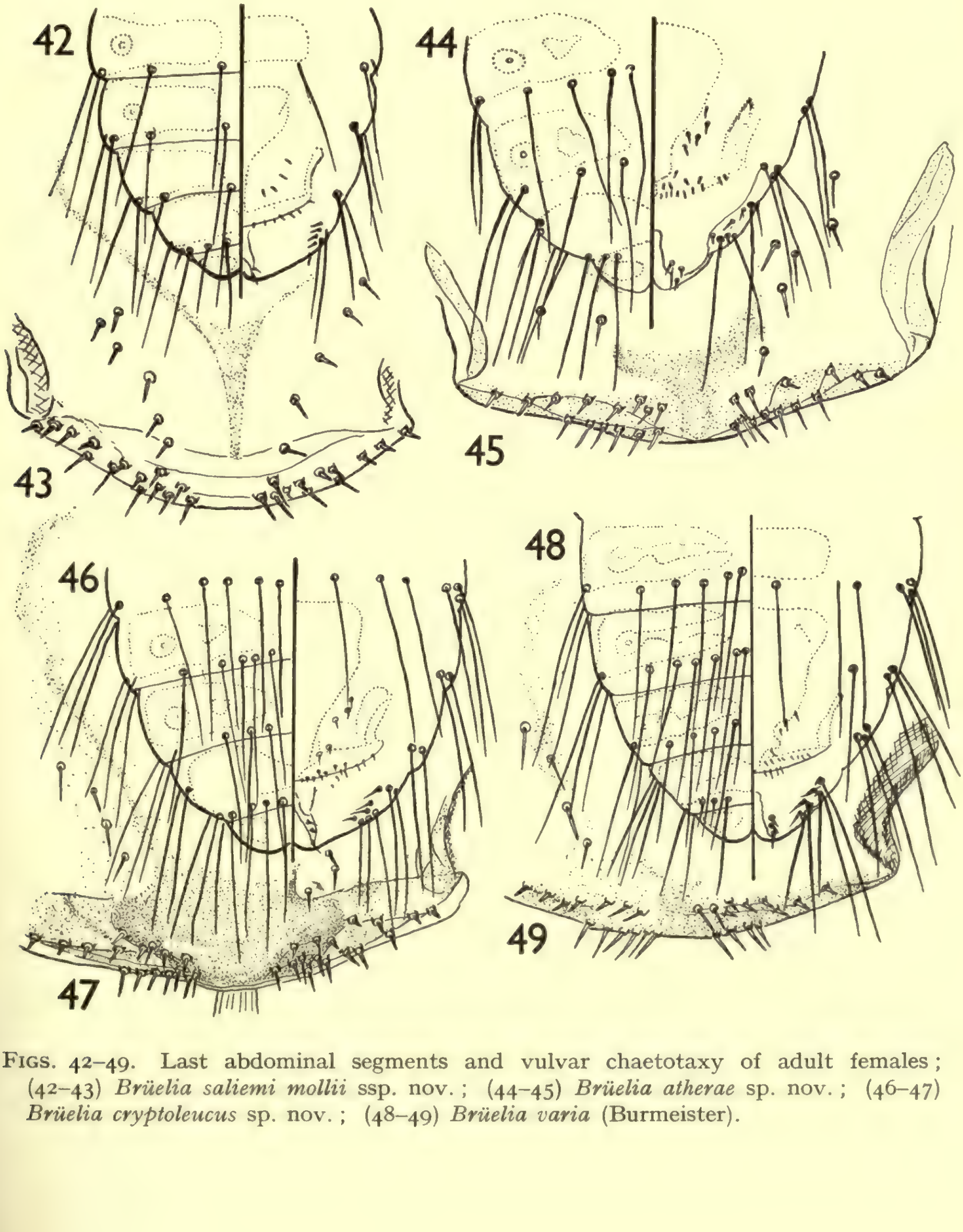
	Male (holotype)	Female (allotype)
Head : pre-antennal	0·239×0·424	0·253×0·486
hind head	0·281×0·521	0·308×0·568
Prothorax	0·123×0·328	0·103×0·342
Pterothorax	0·184×0·452	0·212×0·547
Abdomen	1·184×0·685	1·541×0·788
L : B of pre-antennal	1 : 1·77	1 : 1·92
L : B of hind head	1 : 1·85	1 : 1·84
Cephalic index	1 : 1·00	1 : 1·04



FIGS. 34–41. Last abdominal segments and vulvar chaetotaxy of adult females (34–35) *Brüelia variegata* sp. nov. ; (36–37) *Brüelia afzali* sp. nov. ; (38–39) *Brüelia uncinosa* (Burmeister) ; (40–41) *Brüelia saliemi* sp. nov.

MATERIAL EXAMINED. Thirty-four males and 30 females from *Corvus corax laurencei* Hume from Shibar Pass, Afghanistan. *Holotype* (male), *allotype* (female) from *Corvus corax laurencei* Hume on slide no. 9765 in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes:* 33 males and 29 females from the same host (data above).

Twenty males and 6 females from *Corvus corax ruficollis* Lesson from Port Sudan, Ahaggar, Ashaira, Palestine and Egypt, were found to be indistinguishable from the above specimens.



FIGS. 42–49. Last abdominal segments and vulvar chaetotaxy of adult females; (42–43) *Brüelia saliemi mollii* ssp. nov.; (44–45) *Brüelia atherae* sp. nov.; (46–47) *Brüelia cryptoleucus* sp. nov.; (48–49) *Brüelia varia* (Burmeister).

Brüelia cryptoleucus sp. nov.

(Text-figs. 19, 46–47, 105–108)

This species resembles *Brüelia varia*, *B. atherae* and *B. nawabi* sp. nov. From all the three, it can be distinguished by (1) the shape of the head, (2) marginal carina, (3) tergal plates in male, (4) shape of the female genital plate. The male genital armature is similar to *B. atherae* from which it can be distinguished by the size of the parameres, which are short and narrow with a simple proximal head. The basal plate is also very narrow.

The abdominal chaetotaxy in this species is also a characteristic feature. The female genital plate differs from all the other species in its shape and marginal chaetotaxy. The ventral hairs on abdominal segment IX are almost double the size found in other species.

Marginal carina, ventral carina, preocular nodus and pre-antennal nodus are well developed.

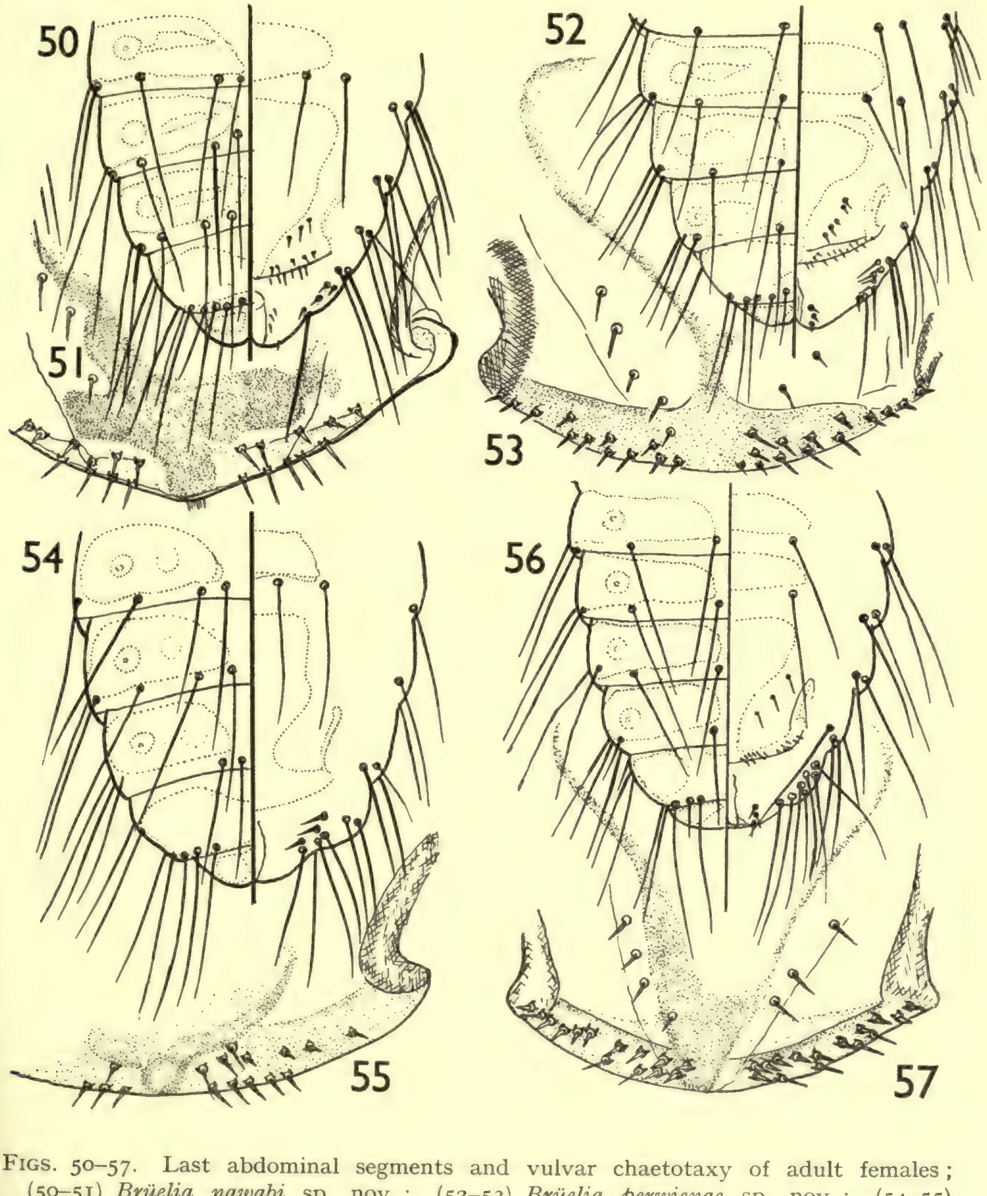
Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	8–9+8–9	1+1	—	9+10	1+1	—
Abdomen :						
II	1+3+3+1	1–2+1–2	0+0	1+3+2+1	4+4	0+0
III	1+4+4+1	1–2+1–2	1–2+1–2	1+4+4+1	5+4	2+1
IV	1+4+4+1	1–2+1–2	2+2	1+4+5+1	4+4	3+3
V	1+4+4+1	1–2+1–2	2+1	1+4–5+5+1	4+4	3+4
VI	1+4+4+1	1–2+1–3	3+3	1+4+4+1	3+3	3+4
VII	1+5+5+1	0+0	3+3	1+4+4+1	0+0	3+3
VIII	1+4+4–5+1	0+0	3–4+2–4	1+3+3–4+1	0+0	3+3
IX	5+3+3+6	0+0	2–3+3–4	4+4	0+0	4+4
X–XI	3+3	0+0	13–14+12–14	—	Vulva : 12+12–13	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head : pre-antennal	0·226 × 0·424	0·238 × 0·493
hind head	0·301 × 0·534	0·315 × 0·589
Prothorax	0·131 × 0·315	0·123 × 0·356
Pterothorax	0·184 × 0·466	0·212 × 0·561
Abdomen	1·062 × ·0753	1·205 × 0·794
L : B of pre-antennal	1 : 1·87	1 : 2·06
L : B of hind head	1 : 1·77	1 : 1·87
Cephalic index	1 : 1·01	1 : 1·06

MATERIAL EXAMINED. Six males and 12 females from *Corvus cryptoleucus* from Texas and Illinois. *Holotype* (male) and *allotype* (female) from *Corvus cryptoleucus* Couch from Texas on slide no. 46 in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes :* 5 males and 11 females from the same host (data above).



FIGS. 50–57. Last abdominal segments and vulvar chaetotaxy of adult females; (50–51) *Brüelia nawabi* sp. nov.; (52–53) *Brüelia perwienae* sp. nov.; (54–55) *Brüelia bipunctata* (Rudow); (56–57) *Brüelia latifasciata* (Piaget).

Brüelia varia (Burmeister), 1838

(Text-figs. 20, 48–49, 109–113)

Nirmus varia Burmeister, 1838, *Handb. Ent.* **2** : 430.

Type host : *Corvus monedula spermologus* Vieillot.

Burmeister (1838) described *Brüelia varia* from material collected from *Corvus corone* and *Corvus monedula*. Giebel (1861 and 1874) referred to this species all the material obtained from *Corvus corone, Corvus frugilegus* and *Corvus monedula*. Hopkins & Clay (1952) have designated *Corvus monedula spermologus* Vieillot as type host of the species under consideration. It is a narrow headed species with the following characters :

MALE. Pre-antennal region long and narrow. Marginal carina entire dorsally and interrupted ventrally and feebly sclerotized medially. Preocular nodus well pigmented, fused with the pre-antennal nodus. Postocular nodus running into preocular nodus. Ventral carina well developed and continuous with the marginal carina. Tergal plates II–IX well formed, narrow, triangular, sloping obliquely downwards in the middle to resemble the tegmina of a katytid : II–VI opening like the beak of a bird ; VII–VIII triangular, each with two uncoloured circular areas ; IX entire ; Sternal plates II–VI transverse. Genitalia as shown in the figures. Basal plate twice as long as the parameres and its distal breadth. Parameres narrow, with characteristic head.

FEMALE. Similar to male but the measurements are greater. Antennae, abdominal plates and chaetotaxy exhibit sexual dimorphism.

MATERIAL EXAMINED. Five males and 7 females from *Corvus m. monedula* from Sweden, Estonia, Salonika and Croatia ; 5 males and 13 females from *Corvus monedula soemoeringii* from Afghanistan. Twenty-six males and 32 females from *Corvus frugilegus frugilegus* from Norfolk, Cornwall, Wilts., Hants and South Uist, Ireland, Orkney, Cumberland ; 2 males and 2 females from *Corvus frugilegus pastinator* Gould from China ; 9 males and 4 females from *Corvus frugilegus tschusii* Hartert from Lyallpur (Pakistan), and 15 males and 44 females from *Corvus corone corone* Linn. and 8 males from *Corvus corone orientalis* Eversmann from Afghanistan were found to be indistinguishable from this species.

Brüelia nawabi sp. nov.

(Text-figs. 21, 50–51, 114–117)

This species closely resembles *Brüelia atherae* sp. nov. from which it can be distinguished by the shape of the head and the development of the marginal and ventral carina.

MALE. Head as long as broad. Fore head twice as broad as long. Marginal carina very narrow, entire dorsally, with a slight median depression, and interrupted ventrally. Preocular nodus well developed but not reaching as far as the pre-antennal nodus. Postocular nodus and marginal temporal carina well formed. Tergal plates well formed, approximate, II–VI interrupted in the middle, VII–XI triangular, *Abdominal Chaetotaxy*

		Male			Female		
		Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax		8–9+9–10	1+1	—	8–9+8–10	1+1	0+0
Abdomen	II	1–2+3+2–3+1	1+1+1+1+1	0+0	1+3+3+1	2+1+1+2	1+1
	III	1+4–5+4–5+1	1+2+2+2+1–2	1+1	1+4+5+1	3+2+2+1	3+3–4
	IV	1+4–5+4+1	2+2+1+2	2+3	1+4+4+1	3+1+1+4	2+2
	V	1+4–5+4–5+1	2+1+1+2	2+2	1+4+4–5+1	3+1+1+3	2–3+4
	VI	1+4–5+4–5+1	1+1+1+1	3+3	1+4+4+1	1+1+1+1	3+3
	VII	1+4–5+5–6+1	0+0	3+3	1+4–5+4–5+1	0+0	4+4
	VIII	1+4–5+4–5+1	0+0	3+3–4	1+3+3+1	0+0	4–6+5
	IX	4–6+5–7+5–6+4–6	0+0	3+3–4	2+1+1+2	0+0	—
	X–XI	—	—	14–17+14–20	—	Vulva : 13–15+12–18	—

Measurements (mm.)

	Male	Female
Head : pre-antennal	0·205×0·404	0·219×0·411
hind head	0·267×0·501	0·261×0·501
Prothorax	0·130×0·301	0·116×0·294
Pterothorax	0·233×0·501	0·219×0·501
Abdomen	1·055×0·684	1·369×0·684
L : B of pre-antennal	1 : 1·97	1 : 1·87
L : B of hind head	1 : 1·87	1 : 1·92
Cephalic index	1 : 1·06	1 : 1·04

entire. Male genital armature as shown in the figure. Basal plate comparatively shorter than in other species of the same group,

FEMALE. Similar to the male, but differs considerably in abdominal chaetotaxy and tergal plates.

Abdominal Chaetotaxy

	Male			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	6–7+6–7	1+1	—	7–8+7–8	1+1	—
Abdomen :						
II	2–3+2–3	1+1–2	0+0	3+3	3+3	0+0
III	1+3+3+1	1+1+1+1	—	1+2–3+3–4+1	3+3	1+1
IV	1+4+3+1	1+1+1+1	2+1–2	1+3+3+1	1–3+2–1	1+1
V	1+4+4+1	1+1+1+1	2+1–2	1+3+2–3+1	1–2+1–2	2+2
VI	1+4+3+1	1+1+1+1	2+2	1+2+2+1	1–1+1–1	3+3
VII	1+3+3+1	0+0	2+2	1+1–2+1–2+1	0+0	2+3
VIII	1+3+3+1	0+0	2+2	1+1–2+1–2+1	0+0	3+3
IX	1+5+4–6+1	0+0	4+4	1+2+2+1	0+0	4+3–4
X–XI	—	—	9+9	—	Vulva : 11+10	—

Measurements (mm.)

	Male (holotype)	Female (allotype)
Head : pre-antennal	0·219×0·438	0·260×0·493
hind head	0·260×0·479	0·281×0·547
Prothorax	0·109×0·253	0·137×0·294
Pterothorax	0·164×0·397	0·171×0·452
Abdomen	1·164×0·637	1·377×0·788
L : B of pre-antennal	1 : 2·0	1 : 1·89
L : B of hind head	1 : 1·84	1 : 1·94
Cephalic index	1 : 1·0	1 : 1·0

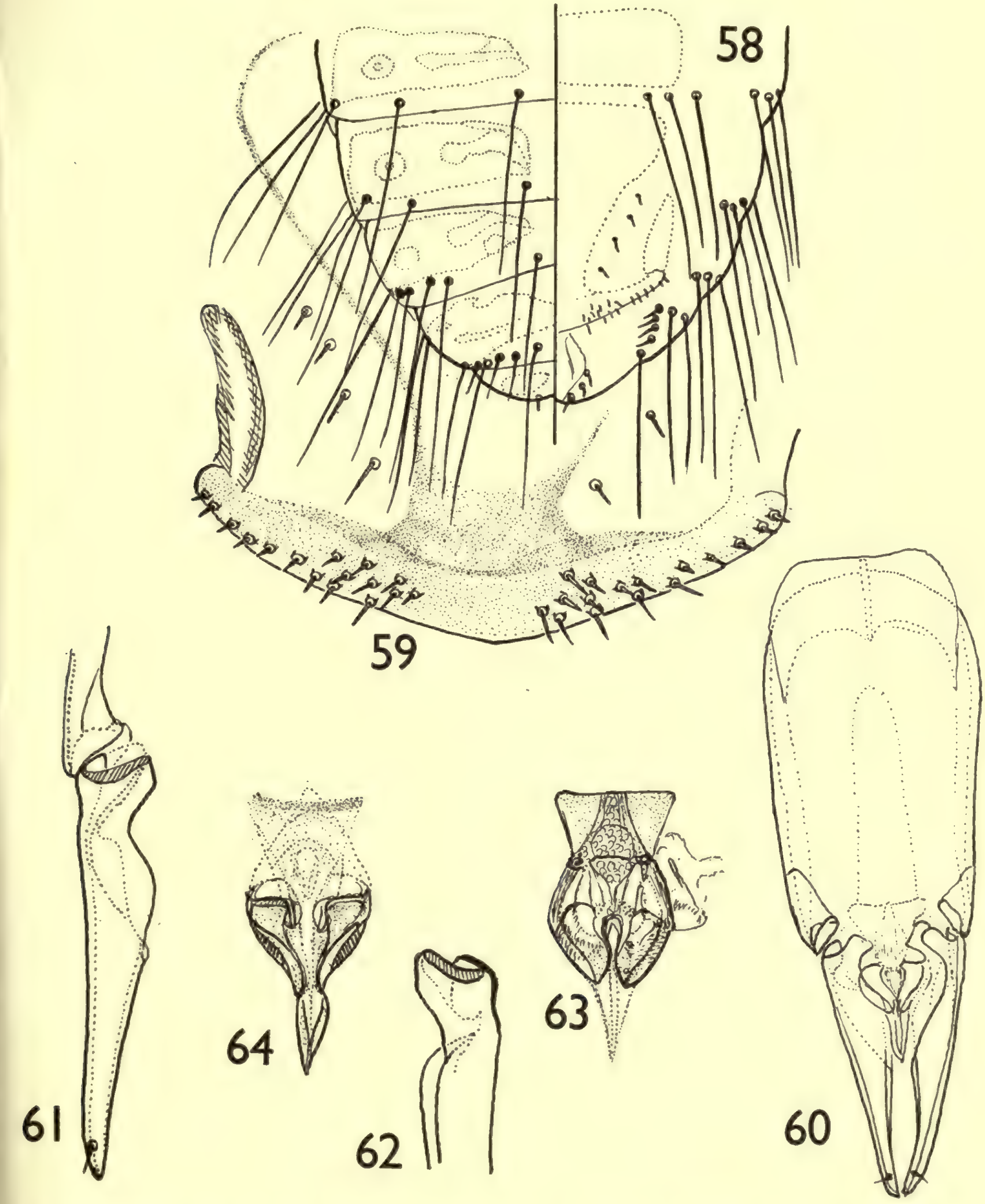
MATERIAL EXAMINED. One male and 4 females from *Corvus capensis* from South West Africa, Damaraland. *Holotype* (male), *allotype* (female) from *Corvus capensis* Licht. from South West Africa, slide no. 13469 in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes :* 3 females from the same host (data above).

Brüelia perwienae sp. nov.

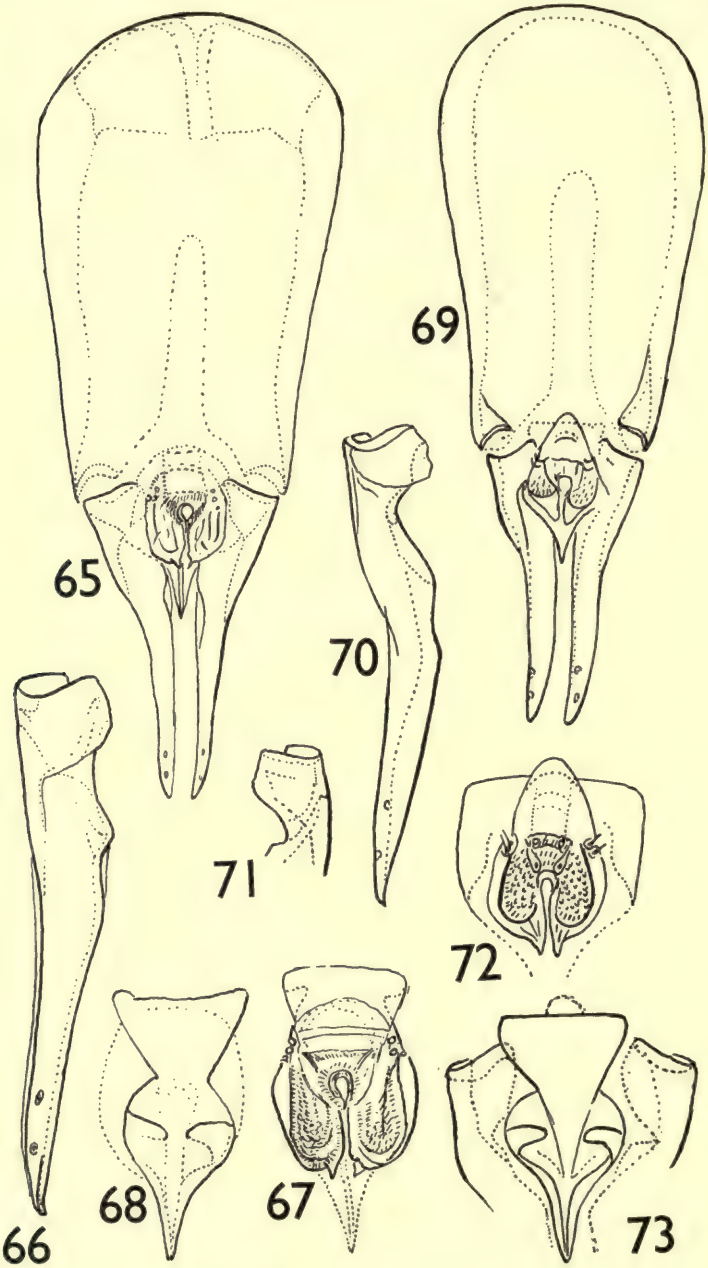
(Text-figs. 22, 52–53, 118–122)

The specimens referred to this name resemble *Brüelia argula* (Burmeister) in all superficial details, but differ in the male genitalia and in the abdominal chaetotaxy of the female. It may also be confused with *Brüelia varia* (Burmeister), but can be separated by the proportions of the parameres and abdominal chaetotaxy.

MALE. Pre-antennal region triangular, fore head truncate. Marginal carina well developed, slightly depressed in the middle, entire dorsally and interrupted ventrally. Preocular nodus well developed. Postocular nodus wanting. Tergal



FIGS. 58–64. (58–59) last abdominal segments of adult female *Brüelia rotundata* (Osborn) and vulvar chaetotaxy of the same; (60–64) male genital armature of *Brüelia argula* (Burmeister): (60) genitalia, (61) parameres, (62) proximal head of parameres, (63–64) two different views of mesosomal plate.



FIGS. 65–73. Male genital armatures: (65–68) *Brüelia leucocephalus* (Nitzsch): (65) genitalia, (66) parameres, (67–68) different views of mesosomal plate; (69–73) *Brüelia theresae* sp. nov.: (69) genitalia, (70) parameres, (71) proximal head of parameres, (72–73) two different aspects of mesosomal plate.

plates well developed, II–VIII wedge-shaped, IX triangular. Parameres about one-quarter of the total length of the genital armature. The details of the proximal head of the parameres are of specific value and shown in the figure. Female similar to the male, although exhibiting sexual dimorphism of antennae and differences in the abdominal chaetotaxy.

Abdominal Chaetotaxy

	Male (holotype)			Female		
	Tergal	Sternal	Pleural	Tergal	Sternal	Pleural
Pterothorax	9+8	1+1	—	7+7	1+1	—
Abdomen II	—	1+1	0+0	1+1	1+1	0+0
III	1+1+1+1	2+2	1+1	2+2	3+3	1+1
IV	2+2+2+2	2+2	3+3	1+1+1+1	3+3	3+3
V	2+4+3+2	2+2	4+3	1+1+1+1	3+3	3+3
VI	2+3+3+2	2+2	3+3	1+1+1+1	2–3+3	3+3
VII	2+4+4+2	0+0	3+3	1+1+1+1	0+0	2+2
VIII	1+5+5+1	0+0	3+2	1+1	0+0	2+3
IX	1+6+7+1	0+0	3+4	3+3	0+0	4+4
X–XI	—	—	22+21	—	Vulva : 13–14+12–14	—

Measurements (*mm.*)

	Male (holotype)	Female (allotype)
Head : pre-antennal	0·184×0·390	0·226×0·417
hind head	0·288×0·479	0·267×0·493
Prothorax	0·123×0·315	0·191×0·321
Pterothorax	0·191×0·479	0·219×0·514
Abdomen	0·842×0·582	1·109×0·631
L : B of pre-antennal	1 : 2·12	1 : 1·84
L : B of hind head	1 : 1·66	1 : 1·84
Cephalic index	1 : 1·01	1 : 1·0

MATERIAL EXAMINED. One male and 5 females from *Corvus nasicus* from Cuba. *Holotype* (male) and *allotype* (female) from *Corvus nasicus* Temminck from Cuba on slide no. 50 and 12669 respectively in Meinertzhagen collection (British Museum (Nat. Hist.)). *Paratypes :* 4 females from the same host (data above).

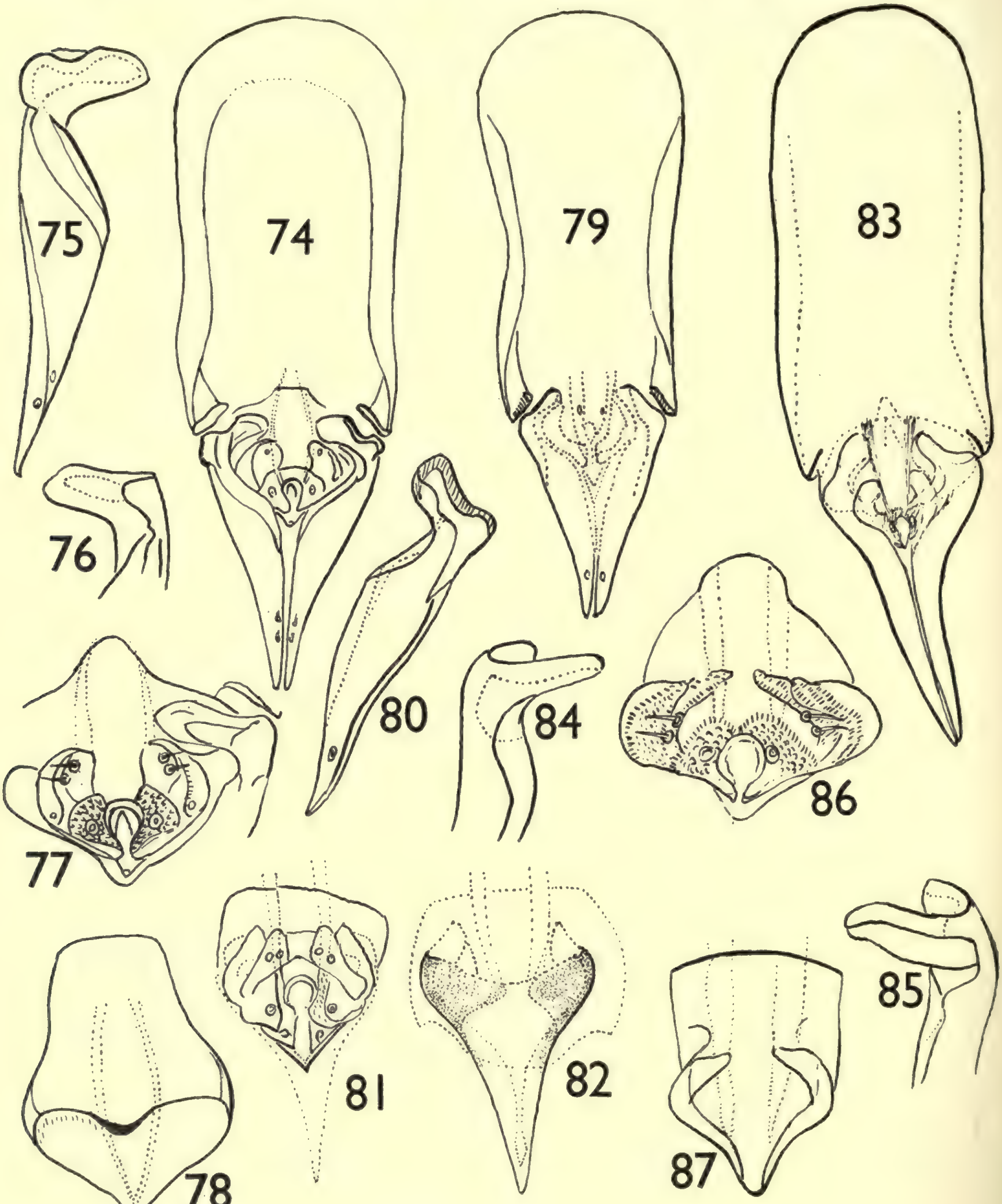
Brüelia bipunctata (Rudow), 1870

(Text-figs. 23, 54–55)

Nirmus bipunctata Rudow, 1870, *Z. ges. Nat. Wiss.* **35** : 467.

Type host : *Corvus albus* Müller.

As stated above, Hopkins & Clay in an unpublished account have shown that this name is not a *nomen novum* for *Brüelia quadrangularis* and that the description



FIGS. 74–87. Male genital armatures: (74–78) *Brüelia tasniemae* sp. nov.: (74) genitalia, (75) paramere, (76) proximal head of paramere, (77–78) two views of mesosomal plate; (79–82) *Brüelia variegata* sp. nov.: (79) genitalia, (80) paramere, (81–82) two different views of mesosomal plate; (83–87) *Brüelia afzali* sp. nov.; (83) genitalia, (84–85) two views of the proximal head of paramere, (86–87) two different views of mesosomal plate.

fits the narrower headed form represented by two female specimens in the British Museum Collection. The general characters of these are as found in the females belonging to *Brüelia tasniemae* sp. nov. and *Brüelia tasniemae variegatus* ssp. nov. and no reliable characters can be found on which to separate them. The characters of the tergal plates, genital plate, and abdominal chaetotaxy although somewhat different in these specimens, cannot be considered reliable as long as a significant number of males and females are not available for examination. This species is provisionaly mentioned here for reference by future workers.

Abdominal Chaetotaxy

	Female		
	Tergal	Sternal	Pleural
Pterothorax	7+7	1+1	—
Abdomen II	3+3	2+2	0+0
III	1+3+3+1	1+3+2+1	1+1
IV	1+3+3+1	1+2+2+1	1+1
V	1+4+4+1	1+2+2+1	1+1
VI	1+2+2+1	1+2+2+1	1+1
VII	1+2+2+1	0+0	3+2
VIII	1–2+2	0+0	3+3
IX	3+3	0+0	4+4
		Vulva : 12+13	—

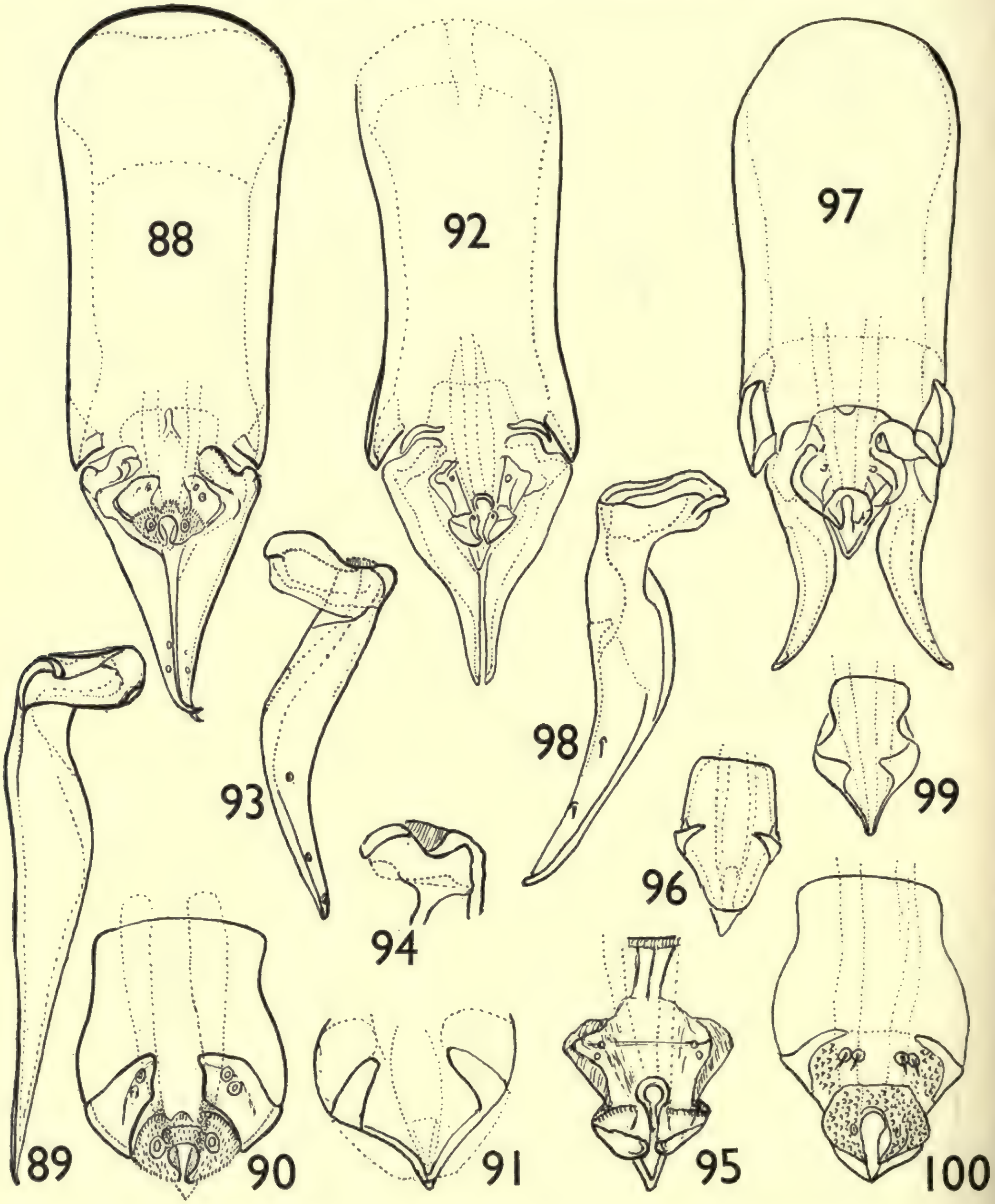
Measurements (mm.)

	Female
Head : pre-antennal	0·285×0·486
hind head	0·309×0·566
Prothorax	0·097×0·327
Pterothorax	0·232×0·522
Abdomen	1·548×0·761
L : B of pre-antennal	1 : 1·705
L : B of hind head	1 : 1·83
Cephalic index	1 : 0·95

FEMALE. Head almost as long as broad. Marginal carina complete above and interrupted ventrally, with a slight concavity and feeble sclerotization in the middle. Ventral carina well formed and fused anteriorly to the ventral component of the marginal carina.

Tergal plates well developed, approximate on segment II–VIII and entire on IX. Tergal plates III–VIII with two colourless spherical areas, tips of each broken.

MATERIAL EXAMINED. Two females from *Corvus albus* Müller from Sudan, slide no. 7942 in Meinertzhagen collection (British Museum (Nat. Hist.)).



FIGS. 88–100. Male genital armatures: (88–91) *Brüelia uncinosa* (Burmeister): (88) genitalia, (89) paramere, (90–91) two different views of mesosomal plate (92–96) *Brüelia saliemi* sp. nov.: (92) genitalia, (93) paramere, (94) proximal head of paramere, (95–96) two different views of mesosomal plate; (97–100) *Brüelia saliemi mollii* ssp. nov.; (97) genitalia, (98) paramere, (99–100) two views of mesosomal plate.

Brüelia latifasciata (Piaget), 1880

(Text-figs. 24, 56–57)

Nirmus latifasciata Piaget, 1880, *Pédiculines*, 143, pl. 11, fig. 11.

Type host : ? *Corvus enca enca* (Horsfield).

Clay (1940) has shown that *Brüelia latifasciata* was described from specimens probably obtained from *Corvus e. enca* (Horsfield) and that " Xulla mangola " as mentioned by Piaget was only the name of a locality. This single type female in the British Museum (Nat. Hist.) has been examined and is mentioned here for reference. We have not been able to examine other material from the type host and resolve the present confusion.

FEMALE. Head triangular, marginal carina interrupted medianly, and anterior margin at this point hyaline. Dorsal pre-antennal suture distinct. Dorsal anterior plate present. Preocular nodus runs across to meet pre-antennal nodus. Ventral carina well formed, but comparatively less sclerotized than marginal carina. The number and arrangement of setae of the head as in other *Brüelia* species.

Tergal plates II–VIII and XI interrupted in the middle, while plate IX–X is entire. Sternal plates II–VI distinct and median. Genital plate triangular. Chaetotaxy as given below.

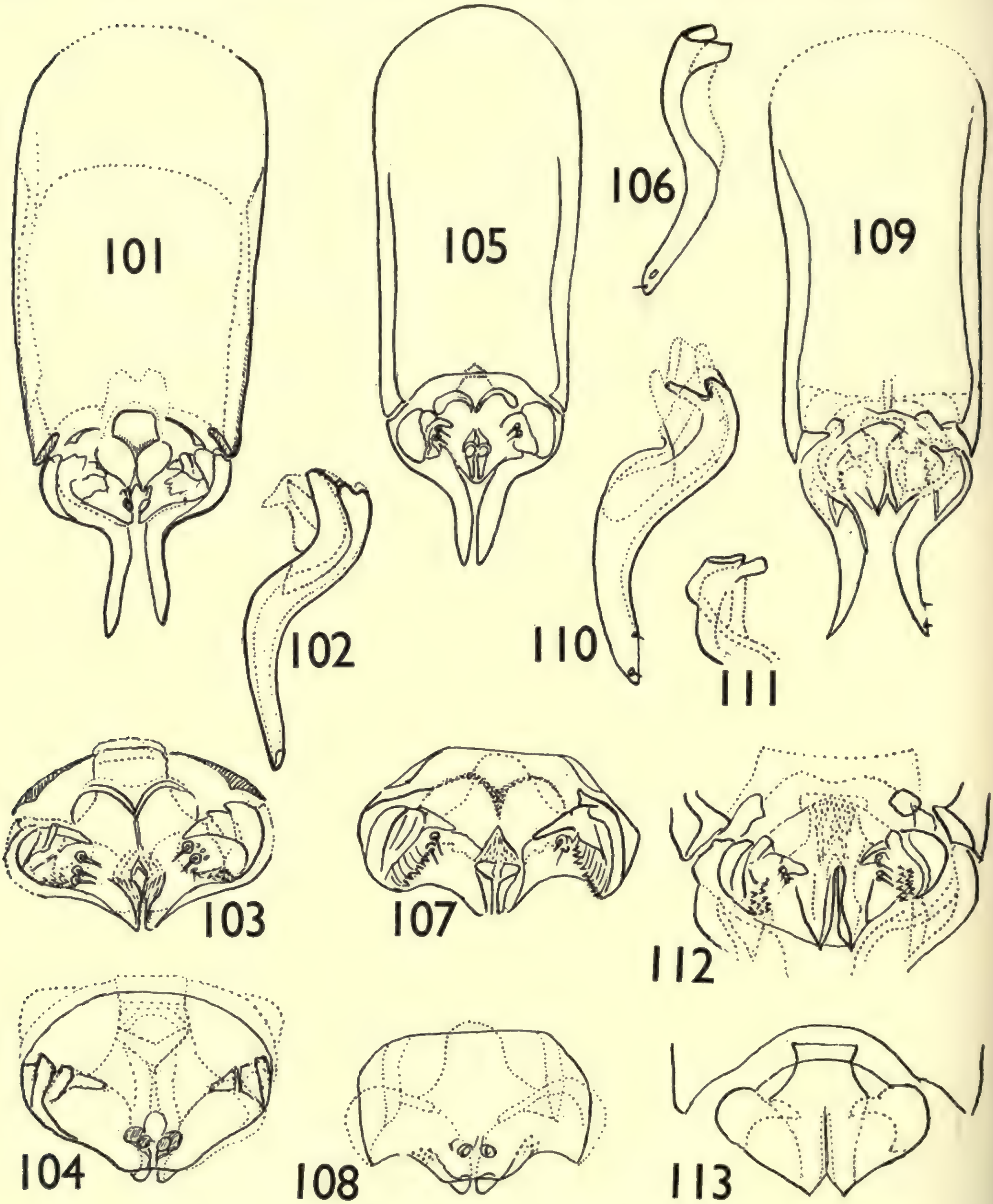
Abdominal Chaetotaxy

		Female (lectotype)		
		Tergal	Sternal	Pleural
Pterothorax .		6+6	1+1	—
Abdomen	II .	—	—	0–0
	III .	1+1	1+1	1+1
	IV .	1+1+1+1	1+1	2+2
	V .	1+1+1+1	1+1	2+2
	VI .	1+1+1+1	1+1	2+2
	VII .	1+1+1+1	0+0	2+2
	VIII .	0+1+1+0	0+0	4+4
	IX .	3+3	0+0	9+9
	X–XI .	See Text-fig.	Vulva : 15+17	—

Measurements (mm.)

	Female (lectotype)
Head : pre-antennal .	0·212×0·411
hind head . .	0·261×0·493
Prothorax . . .	0·103×0·308
Pterothorax . . .	0·226×0·514
Abdomen . . .	0·116×0·637
L : B of pre-antennal .	1 : 1·94
L : B of hind head . .	1 : 1·88
Cephalic index . .	1 : 1·04

MATERIAL EXAMINED. One female (Lectotype) in British Museum (Nat. Hist.).



FIGS. 101–113. Male genital armatures: (101–104) *Brüelia atherae* sp. nov.: (101) genitalia, (102) parameres, (103–104) two different views of mesosomal plate; (105–108) *Brüelia cryptoleucus* sp. nov.: (105) genitalia, (106) paramere, (107–108) two different views of mesosomal plate; (109–113) *Brüelia varia* (Burmeister): (109) genitalia, (110) paramere, (111) proximal head of parameres, (112–113) two different views of mesosomal plate.

Brüelia rotundata (Osborn), 1896

(Text-figs. 25, 58–59)

Nirmus rotundata Osborn, 1896, *Bull. U.S. Bur. Ent.* (*n.s.*), **5** : 226.

Type host : *Corvus corone brachyrhynchos* Brehm.

This is a broad-headed form distinguished from allied forms by the greater breadth of the temples, tergal plates and chaetotaxy. There are no males of this species in the British Museum (Nat. Hist.) collection and therefore comparison with allied species is difficult ; the following description is provisionally provided to distinguish the females.

FEMALE. Head broader than long. Marginal carina entire, modified medially, with hyaline anterior margin. Dorsal suture present. Ventral carina well formed, fused to the anterior marginal carina. Tergal plates II–VIII approximate, IX entire, X–XI approximate. Sternal plates II–VI well formed. Genital plate conical, with obtuse apical angle.

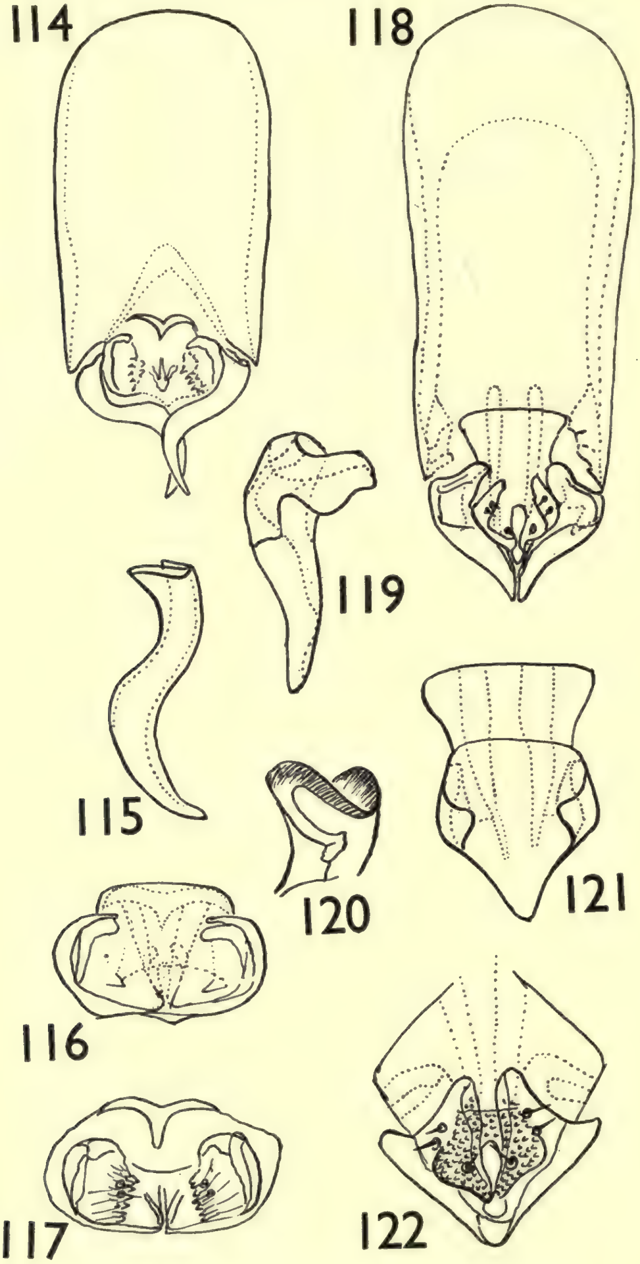
Abdominal Chaetotaxy

	Female		
	Tergal	Sternal	Pleural
Pterothorax .	8–9+8–9	1+1	0+0
Abdomen II .	1+1+1+1	1+1	0+0
III .	1+1+1+1	1+1–2	2+1–2
IV .	1+1+1+1	2+2–3	3+3
V .	1+1+1+1	2+2–3	3+3
VI .	1+1+1+1	2+2–3	3–4+3–5
VII .	1+1–2+1–2+1	0+0	3–4+4
VIII .	1–2+1–2+1–2+1–2	0+0	4+4
IX .	1+5+4–5+1	0+0	4+4–5
X–XI .	See Text-fig.	Vulva : 15–18+15–20	—

Measurements (*mm.*)

	Female
Head : pre-antennal .	0·219×0·507
hind head . .	0·315×0·616
Prothorax . . .	0·089×0·349
Pterothorax . . .	0·288×0·616
Abdomen . . .	1·335×0·801
L : B of pre-antennal .	1 : 2·15
L : B of hind head . .	1 : 1·95
Cephalic index . .	1 : 1·15

MATERIAL EXAMINED. Four females from *Corvus corone brachyrhynchos* Brehm. from California and Kansas.



FIGS. 114–122. Male genital armatures: (114–117) *Brüelia nawabi* sp. nov.: (114) genitalia, (115) paramere, (116–117) two different views of mesosomal plate; (118–122) *Brüelia perwienae* sp. nov.: (118) genitalia, (119) paramere, (120) proximal head of paramere, (121–122) different views of mesosomal plate.

SUMMARY

All the known species of *Brüelia* from *Corvus* species are discussed and eight new species and three new subspecies are described. The species of previous authors are redescribed and figured.

LIST OF SPECIES AND SUBSPECIES DISCUSSED

(Type hosts in bold type)

1. *Brüelia argula* (Burmeister), 1838.
    Corvus corax corax.
    Corvus c. laurencei.
    Corvus c. tingitanus.
    Corvus c. ruficollis.
2. *Brüelia afzali* sp. nov.
    Corvus cryptoleucus.
3. *Brüelia atherae* sp. nov.
    Corvus corax laurencei.
4. *Brüelia bipunctata* (Rudow), 1870.
    Corvus albus.
5. *Brüelia cryptoleucus* sp. nov.
    Corvus cryptoleucus.
6. *Brüelia latifasciata* (Piaget), 1880.
    Corvus enca enca.
7. *Brüelia leucocephalus* (Nitzsch), 1866.
    Corvus albicollis.
    Corvus affinis.
8. *Brüelia nawabi* sp. nov.
    Corvus capensis.
9. *Brüelia perwienae* sp. nov.
    Corvus nasicus.
10. *Brüelia quadrangularis* (Rudow), 1869.
    Corvus albus.
    Corvus corax edithae.
11. *Brüelia rotundata* (Osborn), 1896.
    Corvus corone brachyrhynchos.
12. *Brüelia saliemi* sp. nov.
    Corvus splendens splendens.
    Corvus s. zugmeyeri.
13. *Brüelia saliemi mollii* ssp. nov.
    Corvus coronoides macrorhynchus.
    Corvus c. intermedius.
    Corvus c. colonorum.
14. *Brüelia tasniemae* sp. nov.
    Corvus frugilegus frugilegus.

15. *Brüelia variegata* sp. nov.
    Corvus capensis.
16. *Brüelia theresae* sp. nov.
    Corvus rhipidurus.
17. *Brüelia uncinosa* (Burmeister), 1838.
    Corvus corone cornix.
    Corvus c. sardonius.
18. *Brüelia uncinosa plena* ssp. nov.
    Corvus c. corone.
19. *Brüelia varia* (Burmeister), 1838.
    Corvus monedula spermologus.
    Corvus m. monedula.
    Corvus m. soemoeringii.
    Corvus frugilegus frugilegus.
    Corvus f. tschusii.
    Corvus corone corone.
    Corvus corone orientalis.

HOST (CORVIDAE) PARASITE (BRÜELIA) INDEX

CORVIDAE HOST	*Brüelia* SPECIES
Aphelocoma coerulescens californica (Vigors)	*deficiens* (Piaget), 1885.
Corvus albus Müller	*bipunctata* (Rudow), 1870. *quadrangularis* (Rudow), 1869.
Covus albicollis Latham	*leucocephalus* (Nitzsch), 1866.
Corvus capensis Licht.	*nawabi* sp. nov. *variegata* sp. nov.
Corvus corax corax Linn.	*argula* (Burmeister), 1838.
Corvus corax edithae Phillips	*quadrangularis* (Rudow), 1869.
Corvus corax laurencei Hume	*argula* (Burmeister), 1838. *atherae* sp. nov.
Corvus corax tingitanus Irby	*argula* (Burmeister), 1838.
Corvus corax ruficollis Lesson	*argula* (Burmeister), 1838. *atherae* sp. nov.
Corvus corone brachyrhynchos Brehm.	*rotundata* (Osborn), 1896.
Corvus corone corone Linn.	*uncinosa plena* ssp. nov. *varia* (Burmeister), 1838.
Corvus corone cornix Linn.	*uncinosa* (Burmeister), 1838.
Corvus corone orientalis Eversman	*varia* (Burmeister), 1838.
Corvus corone sardonius Kleinschmidt	*uncinosa* (Burmeister), 1838.
Corvus coronoides colonorum Swinhoe	*saliemi mollii* ssp. nov.
Corvus coronoides intermedius Adams	*saliemi mollii* ssp. nov.
Corvus coronoides macrorhynchus Wagler	*saliemi mollii* ssp. nov.
Corvus cryptoleucus Couch.	*afzali* sp. nov. *cryptoleucus* sp. nov.
Corvus enca enca (Horsfield)	*latifasciata* (Piaget), 1880.
Corvus frugilegus frugilegus Linn.	*tasniemae* sp. nov. *varia* (Burmeister), 1883.
Corvus frugilegus tschusii Hartert	*varia* (Burmeister), 1838.

CORVIDAE HOST	*Brüelia* SPECIES
Corvus monedula monedula Linn.	*varia* (Burmeister), 1838.
Corvus monedula soemoeringii Fisher	*varia* (Burmeister), 1838.
Corvus monedula spermologus Vieillot	*varia* (Burmeister), 1838.
Corvus nasicus Temminck	*perwienae* sp. nov.
Corvus rhipidurus Hartert	*theresae* sp. nov.
Corvus splendens splendens Vieillot	*saliemi* sp. nov.
Corvus splendens zugmeyeri Laubmann	*saliemi* sp. nov.
Cyanocitta cristata cristata (Linn.)	*clayae* Ansari, 1956.
Cyanocitta stellari frontalis (Ridgway)	*deficiens* (Piaget), 1885.
Cyanocorax cyanomelas (Vieillot)	*nitzschi* Kéler, 1938.
Cyanopica cyanus cooki Bonaparte	*deficiens* (Piaget), 1885.
Dendrocitta rufa vagabunda (Latham)	*meinertzhageni* Ansari, 1956.
Garrulus glandarius glandarius (Linn.)	*glandarii* (Denny), 1842.
Garrulus glandarius krynicki Kaleniczenko	*glandarii* (Denny), 1842.
Garrulus glandarius rufitergum Hartert	*glandarii* (Denny), 1842.
Garrulus glandarius theresae Meinertzhagen	*glandarii* (Denny), 1842.
Nucifraga caryocatactes caryocatactes (Linn.)	*olivacea* (Burmeister), 1838.
Nucifraga caryocatactes multipunctata Gould	*multipunctata* (Clay), 1936.
Perisoreus infaustus infaustus Linn.	*perisorius* Ansari, 1956.
Ptilostomus afer (Linn.)	*zohrae* Ansari, 1956.
Pica pica bactriana Bonaparte	*biocellata* (Piaget), 1880.
pica pica hudsonia (Sabine)	*biocellata* (Piaget), 1880.
Pica pica leucoptera Gould	*biocellata* (Piaget), 1880.
Pica pica nuttalli Audebon	*biocellata* (Piaget), 1880.
Pica pica sericea Gould	*biocellata* (Piaget), 1880.
Podoces biddulphi Hume	*koslovae* (Clay), 1936.
Podoces hendersoni Hume	*koslovae* (Clay), 1936.
Pyrrhocorax pyrrhocorax docilis (Gmelin)	*biguttata docilis* Ansari, 1956.
Pyrrhocorax graculus graculus (Linn.)	*biguttata* (Kellogg & Paine), 1914.
Pyrrhocorax pyrrhocorax himalayanus Gould	*biguttata* (Kellogg & Paine), 1914.
Pyrrhocorax pyrrhocorax pontifex Stresemann	*biguttatus* (Kellogg & Paine), 1914.
Pyrrhocorax pyrrhocorax pyrrhocorax (Linn.)	*biguttata* (Kellogg & Paine), 1914.
Urocissa flavirostris cuculata Gould	*husaini*, Ansari, 1956.
Urocissa melanocephala occipitalis (Blyth)	*hussaini* Ansari, 1956.
Xanthura yncas galeata Ridgway	*hopkinsi* Ansari, 1956.
Zavattariornis stressemanni Moloni.	*zavattariornis* Ansari, 1956.
Probably a member of the Corvidae	*hamatofasciata* (Piaget), 1890.

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BRITISH MUSEUM 13 AUG 1957 NATURAL HISTORY

THE PSEUDOCOCCIDAE
(HOM. : COCCOIDEA)
DESCRIBED BY H. C. JAMES FROM EAST AFRICA

G. DE LOTTO

BULLETIN OF
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ENTOMOLOGY Vol. 5 No. 5
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BY

G. DE LOTTO

Department of Agriculture, Kenya

Pp. 183–232 ; 24 *Text-figs.*

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THE EAST AFRICAN PSEUDOCOCCIDAE HOM.: COCCOIDEA DESCRIBED BY H. C. JAMES

By G. DE LOTTO

Department of Agriculture, Kenya

THE Coccoid family of Pseudococcidae is of particular economic importance and the need for a thorough revision is emphasized by the fact that in many instances related research is being hindered by inadequate taxonomic knowledge.

The present paper is the first of a series on the Pseudococcidae of Africa south of the Sahara and forms part of a detailed study now being undertaken jointly by the present author and by Dr. D. J. Williams of the Commonwealth Institute of Entomology.

A scheme to cover this study was approved by the Committee for Colonial Agricultural, Animal Health and Forestry Research in 1955, and provision has been made for the work in East Africa to be financed from Colonial Development and Welfare funds.

The project consists of an examination of all the species from the region, from type material where possible, and in redescribing and illustrating very many of them. There are over one hundred described species from the area and these together with several apparently new species will be dealt with in the course of a series of papers by either Dr. D. J. Williams or the present author.

It is the intention to leave the final generic revision until all this preliminary work has been completed and the fauna can be viewed as a whole against the background of the most recent work of other specialists in the group elsewhere in the world. It is hoped that the whole work when completed will provide an up-to-date monograph of the family as represented in Africa south of the Sahara.

This paper deals with the Pseudococcidae described by H. C. James from Kenya, Tanganyika and Uganda. In five short works published between 1933 and 1936 James treated as new altogether thirty-two species. Of these only one species—*Ripersia nuda*—is omitted here, as no material of any sort was available for study. The description or discussion in nearly all cases is based on a study of the James slides, including types, in the Green collection of Coccoidea, undertaken by the writer at the British Museum (Natural History), London.

As a result of the present work twenty-four species are retained as valid. Strickland (1947 : 512) who studied the identity of *Paraputo multispinosa* sunk it as a synonym of *P. ritchei* Laing. A list of the James species which have been synonymized in this paper is as follows :

Pseudococcus longirostralis James = *brevipes* Cockerell.
Pseudococcus simulator James = *muraltiae* Brain.
Rhizoecus makoboensis James = *geniculatus* James.
Trionymus insularis James = *sanguineus* James.
Trionymus panici James = *sanguineus* James.
Trionymus praegrandis James = *sacchari* Cockerell.

Others among those considered in the present paper may have to be sunk as synonyms of species previously described by other authors when the remaining Pseudococcidae of the African continent south of the Sahara have been examined.

Annulococcus ugandaensis James

(Text-fig. 1)

Annulococcus ugandaensis James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 209.

The material examined was a single adult female in good condition except that the apical and pre-apical joints of one antenna were missing and the opposite antenna was abnormally built up with seven joints only. The slide was labelled as follows : " *Annulococcus ugandaensis* sp. n., mile 90 Jinja-Tororo Rd., N. Uganda, roots of grasses, 1.ii.1933, co-type, H. C. J."

" Adult female with a dusting of white wax (little more than a wax-like bloom) ; no tassels ; body content pale strawberry in colour ; ovisac not seen. Length of adult 2·30 mm.; breadth 1·10 mm." (James, *l.c.*).

Body of mounted specimen elongate elliptical. Marginal cerarii reduced in number by the absence of some pairs in the thorax and anterior abdominal segments. Altogether twelve pairs recognizable, each normally formed by two conical spines, sometimes of different size. The spines are noticeably smaller and tend to be widely separated from each other in the anterior pairs ; frontal cerarii each represented by a single spine. The cerarian spines are not associated with pores or auxiliary setae. Anal lobes devoid of sclerotized areas on dorsum and without ventral sclerotized bars. Each apical seta very long and robust; each subapical one much smaller. Multilocular disc pores of normal type very abundant on ventral side of four ultimate abdominal segments. Several others scattered over both sides of body. Numerous large multilocular pores distributed on venter, especially along margin, and on dorsum. These glands are normally provided with seven or eight loculi, seldom with five or six, but a few with four also occur. No glands were found in the specimen examined with nine loculi as recorded by James in his original description. These glands are always larger than the usual multilocular disc pores, and their size varies according to the number of loculi. Tubular ducts with oral rim very small and short, moderately chitinized. Circular disc pores very small. Both are rather numerous and evenly distributed on dorsal and ventral side of the body. Trilocular pores entirely absent. Dorsal setae long, numerous ; ventral ones somewhat shorter and

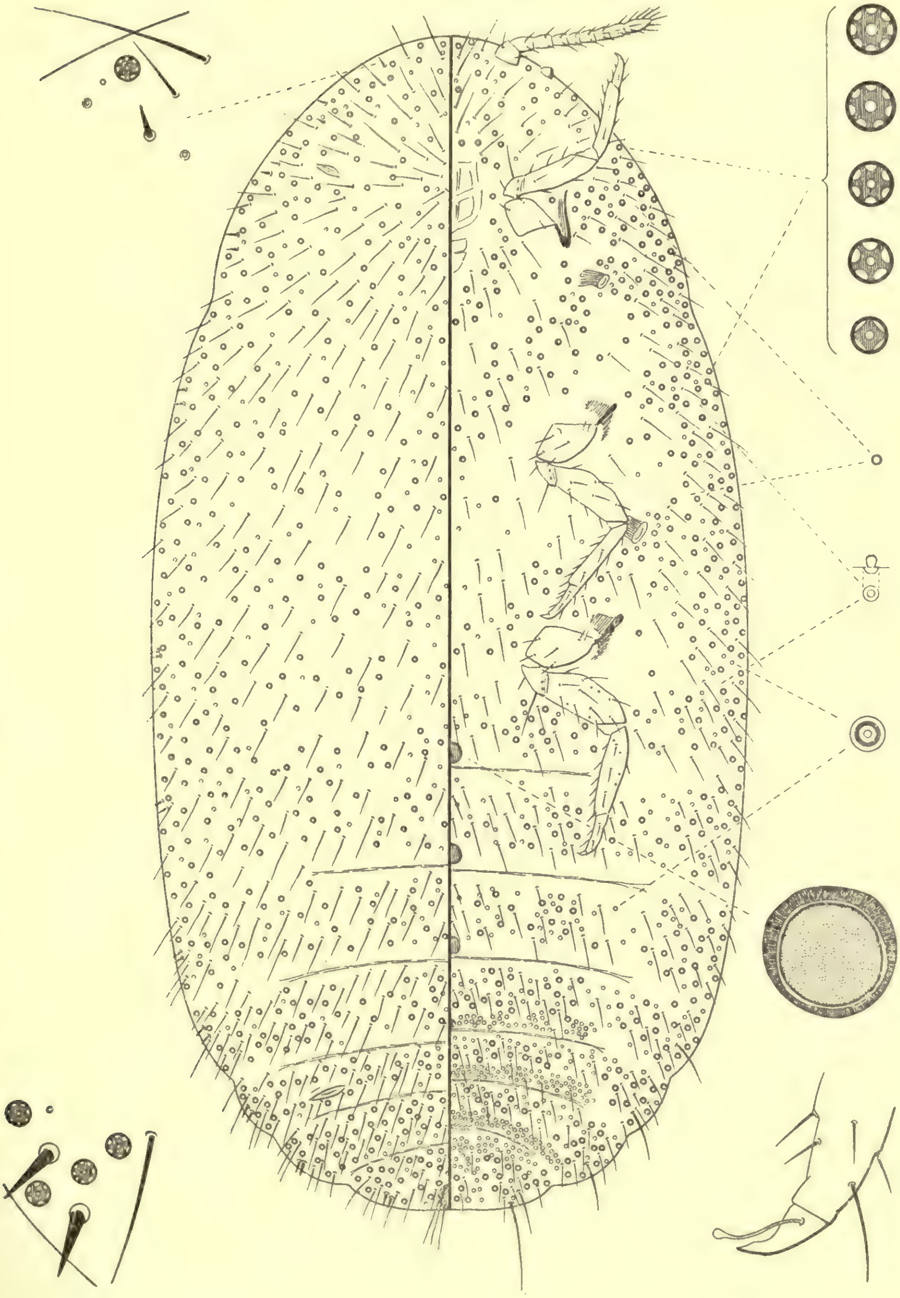

FIG. 1

Annulococcus ugandaensis James.

more widely distributed. One long robust seta is inserted on ventral marginal area of three pre-anal segments. Dorsal ostioles poorly developed. Four circuli; first three having more or less the same diameter; posterior much smaller; all with surface moderately chitinized. Legs well developed with small denticle on the claw; hind femur and tibia with a few translucent pores. According to James the antennae are of nine joints.

Paraputo multispinosa James (= ***Paraputo ritchiei*** Laing)

Paraputo multispinosa James, 1935, *Stylops* **4** : 233.

This species has been already studied by Strickland (1947 : 512) who sunk it as a synonym of *Paraputo ritchiei* Laing. His conclusions are here accepted.

Phenacoccus locustus James

(Text-fig. 2)

Phenacoccus locustus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 204.

The specimen available for study was an adult female in fairly good condition labelled: " *Phenacoccus locustus* sp. n., holotype, from roots of *Hyparrhenia ruprechtii* Fourn., Kericho, 31.v.1931, 6,400 ft., coll. H. C. J."

" Adult female elongate oval, thickly coated with white wax without definite pattern; marginal tassels short. Length 2·28 mm.; breadth 1·53 mm." (James, *l.c.*).

Body of mounted female rather broadly oval. Margin of body provided with a complete series of eighteen pairs of cerarii each with two small spines except the four most anterior pairs which have three spines. Each cerarius is beset with four to seven trilocular pores. Anal lobe cerarii each with the two spines surrounded by some trilocular pores enclosed in a roundish moderately chitinized area. Anal lobes each with a long robust apical seta and three or four shorter and slender subapical ones. Sclerotized bars absent. Multilocular disc pores of usual type occurring only on ventral side of four ultimate abdominal segments as follows: (VI) 35; (VII) 98; (VIII) 121; (IX plus X) 92. Pores on segments VI and VII arranged in a linear row along distal margin, while on segment VIII a few occur on median area and also along the basal margin. Other multilocular disc pores slightly larger than normal ones, occur in clusters of two to four—normally three. Each group is associated with three to five tubular ducts with oral collar, one of which is always smaller and situated in the middle. These clusters of multilocular disc pores rather abundant on both sides of body and on postsoma they are arranged in segmental transverse rows. Quinquelocular pores present only on venter, not numerous. Dorsal tubular ducts absent, except those associated with disc pores. Ventral tubular ducts few and crowded in three groups on marginal area of the last three abdominal segments; a few widely scattered. Trilocular pores evenly distributed, not numerous. Circular disc pores smaller than trilocular ones, few and scattered on both sides of body. Dorsal setae very small, spiniform; ventral ones fewer, long and slender. Anterior and posterior dorsal ostioles rather poorly developed. Circulus absent. Legs normal,

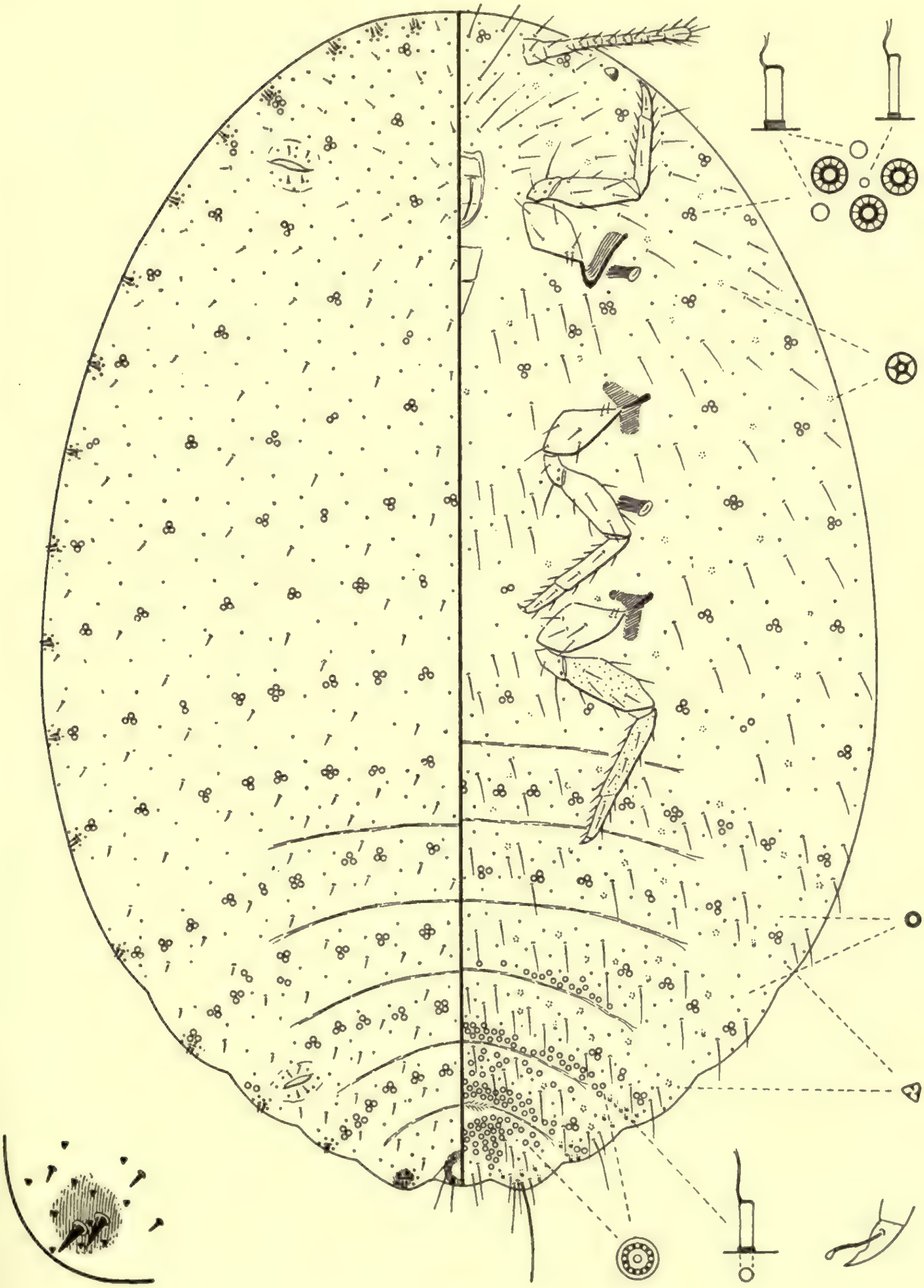

FIG. 2
Phenacoccus locustus James.

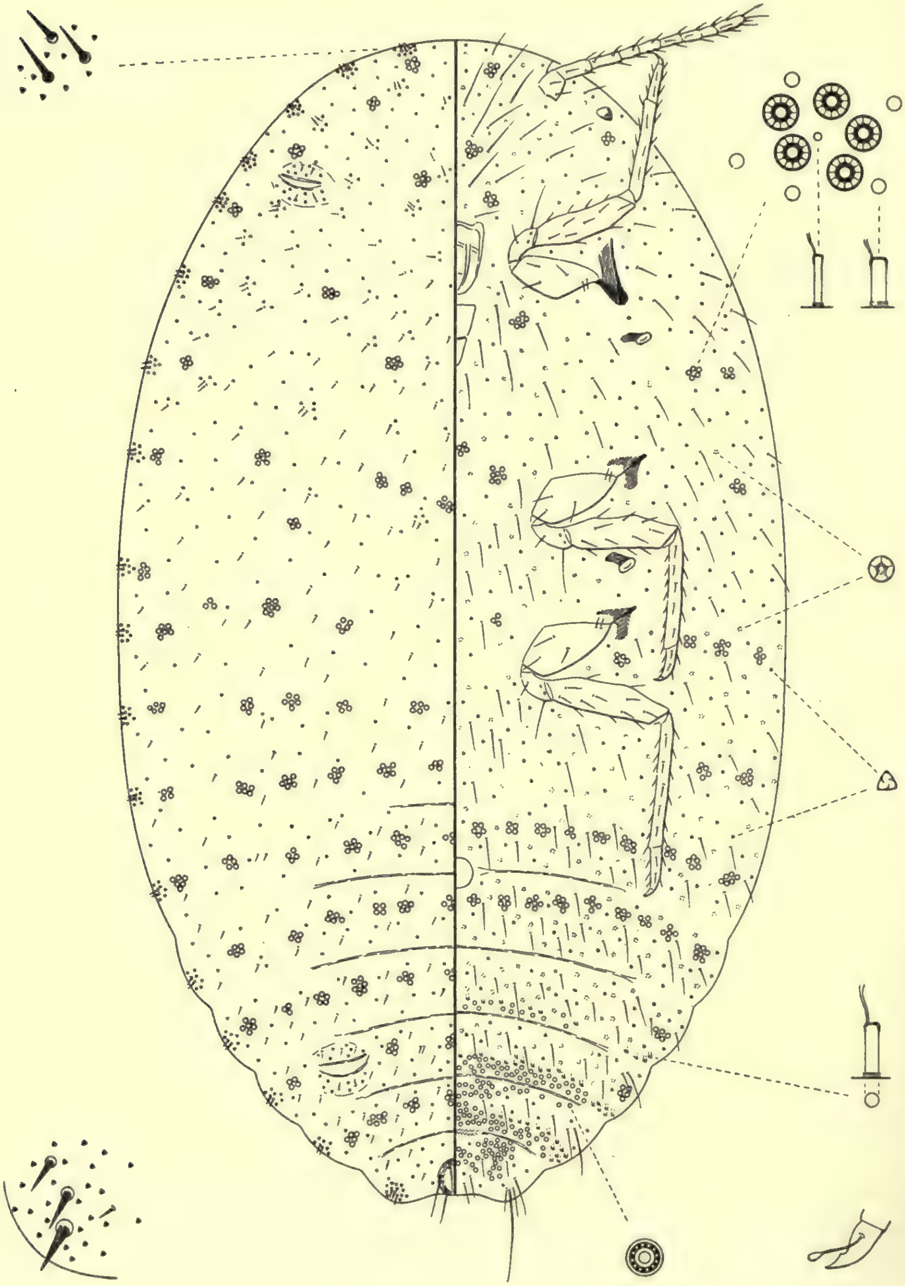

FIG. 3
Phenacoccus trispinosus James.

with small denticle on the claw and numerous translucent pores on hind femur and coxa. Antennae with nine joints.

Phenacoccus trispinosus James

(Text-fig. 3)

Phenacoccus trispinosus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 206.

A single slide labelled : " *Phenacoccus trispinosus* sp. n., potatoes, Kabete, Kenya, 14.i.1932, H. C. J." with nothing to indicate if the specimen was the holotype or a paratype. The specimen was in fairly good condition except that some of the cerarian spines and some of the dorsal and ventral setae were missing.

" Appearance in life unknown. Length 3·0–4·25 mm.; breadth 1·8–2·5 mm." (James, *l.c.*).

Body of mounted specimen elongate oval. Margin of the body with eighteen pairs of cerarii. Anal lobe cerarii each with three spines of different size beset by a loose group of trilocular pores ; area about them not sclerotized. Remaining cerarii with two spines except the two anterior ones which have three spines. Cerarian spines short rather slender and surrounded by ten or more trilocular pores. Anal lobes without sclerotized bars on ventral side. Apical setae long and robust each with three or four smaller subapical ones. Multilocular disc pores of normal type limited to ventral side of last four abdominal segments as follows : (VI) 37 ; (VII) 98 ; (VIII) 164 ; (IX plus X) 102. Pores on segments VI and VII are arranged in a fairly regular linear row along distal margin ; on segment VIII a few pores occur on median area and along basal margin. Larger multilocular disc pores normally set in clusters of five or six glands ; clusters with three, four or seven glands also occur. Each cluster is associated with five to eight tubular ducts with oral collar, one of which is always smaller and situated in the middle. Clusters not numerous and distributed on both sides of body, but only on dorsum of last and on venter of (IV) and (V) abdominal segments are they arranged in transverse rows. Quinquelocular pores present only on ventral side where they are rather numerous especially on postsomatic area. Dorsal tubular ducts absent except those associated with the large multilocular disc pores. Ventral tubular ducts arranged in small groups on marginal area of three ultimate segments anterior to anal lobes and in front to normal multilocular disc pores ; a few others widely scattered. Trilocular pores evenly distributed, not numerous. Circular disc pores apparently absent. Dorsal setae small, spiniform, at times—particularly on head and thorax—set in pairs and surrounded by two to four trilocular pores.[1] Ventral setae long and slender ; one robust seta is inserted on margin of last three abdominal segments. Dorsal ostioles with a large opening but not prominent. Circulus membranous, circular in shape. Legs normal, with small denticle on the claw ; hind legs without translucent pores. Antennae nine-jointed.

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[1] One of these peculiar features on the head misled James to describe it as a nineteenth cerarius.

Pseudococcus concavocerarii James

(Text-fig. 4)

Pseudococcus concavocerarii James, 1934, *Stylops* **3** : 105.

Two slides each with a single specimen in fairly good condition, though partly distorted. Both were labelled : " *Pseudococcus concavocerarii* sp. n., foliage of *Coffea arabica*, Kitale, Kenya, 22.vii.1933, H. C. J."

" Adult female : The resectionary covering is a thin dusting of white wax without definite pattern ; waxy tassels very slender, of uniform diameter, increasing progressively in length posteriorly ; the anal, penultimate and antepenultimate pairs of tassels may be longer than twice the length of the body ; the lateral tassels may exceed in length the width of the body. Body elongate oval ; its length varies from 1·70–4·10 mm., its breadth from 0·80–2·20 mm.; body content dark red deepening with the age of specimens ; oviparous. Perfect ovisac not observed." (James, *l.c.*).

The following redescription is based on specimens in the collection of the Department of Agriculture, Nairobi, which were compared with those in the British Museum. The specimen used for the accompanying figure was collected on *Coffea arabica*, Toro (Uganda).

Mounted specimens elongate oval. Margin of body provided with seventeen pairs of cerarii. Each anal lobe cerarius with two strong conical spines of slightly different size, set into a deep cup-like invagination of dermis and beset by a cluster of several trilocular pores and three or four auxiliary setae ; sclerotized area large, elongate. Pre-anal cerariis also situated in rather deep depressions ; spines somewhat smaller than those of anal lobe cerarii and surrounded by numerous trilocular pores and four or five slender auxiliary setae ; sclerotized area around each cerarius rather large, roundish. Remaining cerarii normally with two small spines, except five or six anterior pairs which have three ; four—seldom five—spines occur on the ocular cerarius (XVI). Each cerarius is associated with three to five slender auxiliary setae and a cluster of several trilocular pores. Anal lobes each with ventral sclerotized bar rather irregularly shaped and variable in size ; apical seta shorter and much more slender than those of anal ring ; subapical seta short. Multilocular disc pores present only on ventral side of abdomen in five groups as follows : (V) 2–9 ; (VI) 22–72 ; (VII) 42–96 ; (VIII) 45–95 ; (IX plus X) 40–69. Most of them arranged in linear rows along distal margin, but a few scattered on the segments involved. Dorsal tubular ducts with oral rim, distributed in a rather regular pattern. Marginal series present singly near each cerarius from antepenultimate pair up to frontal one, with the exception of (XIV) and (XV) cerarii where they are missing. Submarginal series extending from sixth abdominal segment as far as prothorax ; median series only present on seventh to fifth or fourth abdominal segments. On head and thorax some ducts are interspersed among these series. A few ducts occur on ventral submarginal area of thorax and first abdominal segments. Ventral tubular ducts with oral collar rather abundant on median and submedian areas of abdominal segments anterior to genital opening, and crowded on margin near each cerarius. Trilocular pores not numerous and uniformly distributed. Circular disc pores smaller than trilocular pores, very few and apparently present only on ventral

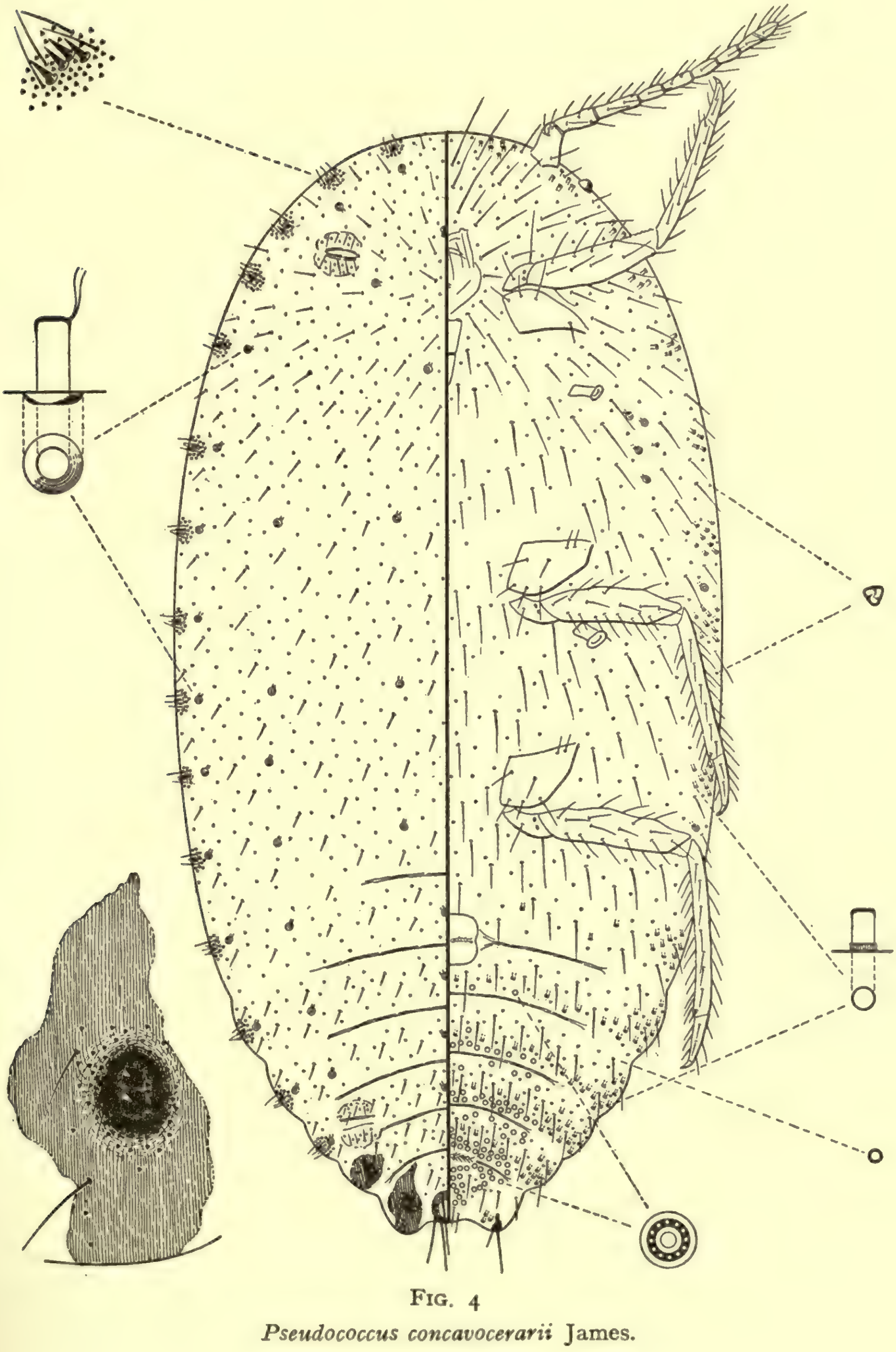

FIG. 4
Pseudococcus concavocerarii James.

submarginal area of last abdominal segments. Dorsal setae short and very slender; ventral ones also slender but much longer. Dorsal ostioles well developed. Circulus large, constricted in the middle, membranous. Legs long and slender, with some translucent pores on hind femur and coxa. Antennae eight-jointed, with a pseudo-articulation on the apical joint.

Pseudococcus erigeroni James

(Text-fig. 5)

Pseudococcus erigeroni, James, 1935, *Stylops* **4** : 236.

Two slides were examined, each with a single adult female, one of which was in fairly good condition. Both were labelled as follows: "*Pseudococcus erigeroni* co-type, from roots of *Erigerum linifolium*, Kericho, Kenya, 31.vi.1931, H. C. J."

"Adult female broadly ovate; coated with white wax, not arranged in a definite pattern; marginal tassels short; body colour orange-brown. Length 1·80–2·50 mm.; breadth 0·90–1·60 mm." (James, *l.c.*).

Body of mounted specimens elongate oval. Margin with seventeen pairs of cerarii, each with two spines, except one or two pairs on thorax which have only one spine. The spines become longer and more slender towards anterior end where they are hardly distinguishable from dorsal setae and tend to be somewhat separated from each other. Each cerarius is beset with a cluster of a few trilocular pores. Anal lobes without sclerotized areas on dorsal surface; cerarian spines large, conical, surrounded by some trilocular pores and two or three auxiliary setae. The remaining cerarii have not auxiliary setae. Ventral side of anal lobe with a long robust apical seta and two small subapical ones. Sclerotized bar absent. Multilocular disc pores present on ventral side of last abdominal segments arranged in six groups as follows: (IV) 11; (V) 25; (VI) 19; (VII) 31; (VIII) 35; (IX plus X) 23. A few others widely scattered on marginal area. Dorsal tubular ducts with oral collar very few, occurring on thorax and abdomen, apparently without any regular pattern. Ventral tubular ducts mostly present on abdomen in association with multilocular disc pores and in small groups on marginal area. Trilocular pores not very numerous, evenly distributed on both sides of body. Circular disc pores few, noticeably smaller than trilocular pores. Dorsal setae short; ventral setae longer and rather robust, particularly so on median and marginal area of abdomen. Dorsal ostioles well developed with lips membranous. Circulus absent. Legs very stout; hind femur and tibia with some translucent pores. Antennae with eight joints.

Pseudococcus kikuyuensis James

(Text-fig. 6)

Pseudococcus kikuyuensis James, 1935, *Stylops* **4** : 235.

The material examined was a single slide containing one adult female with the prosoma partly distorted and labelled with the following data: "*Pseudococcus kikuyuensis*, holotype, leaves of *Canthium nitens*, Komothai, Kikuyu Reserve, 1.ii.1933, H. C. J."

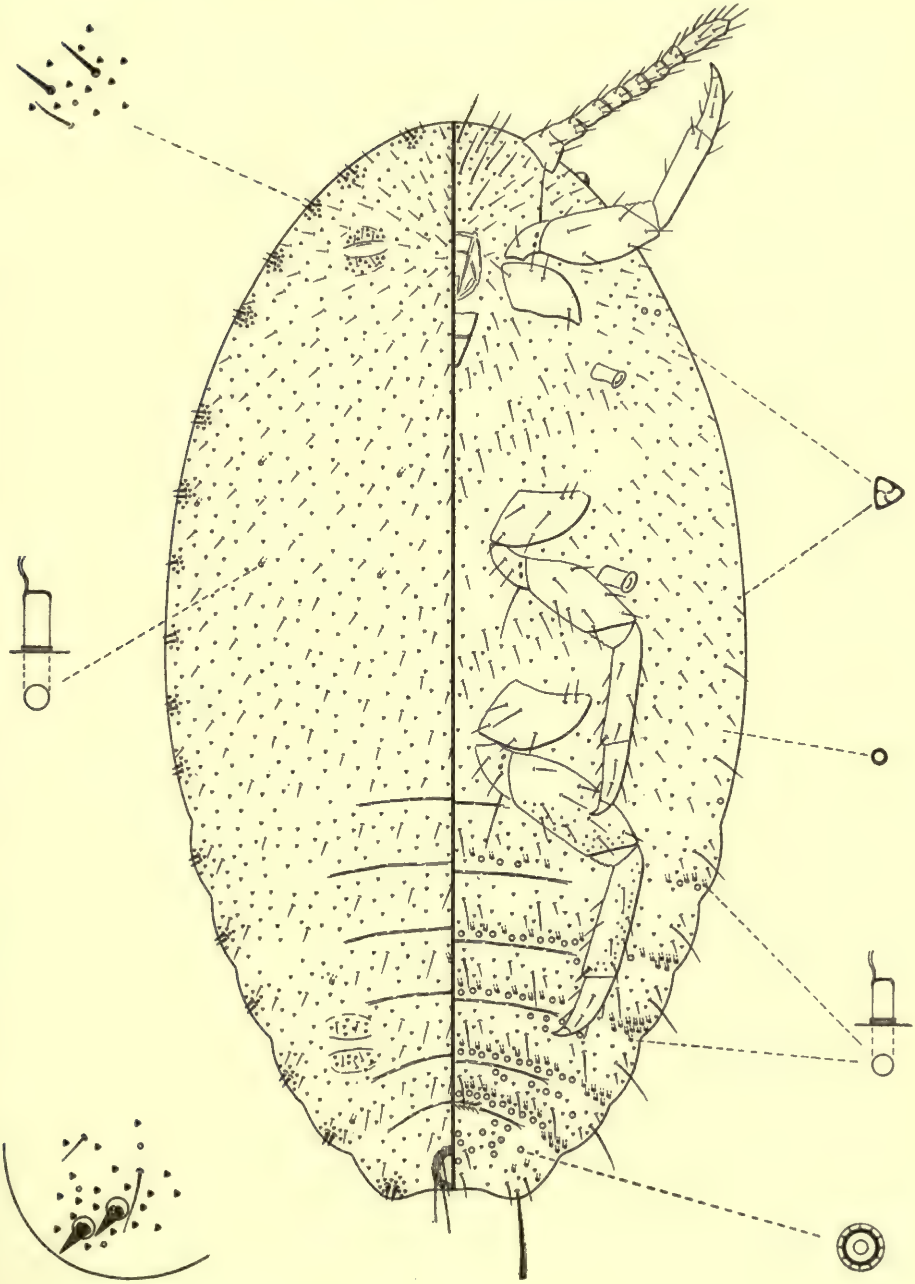

FIG. 5
Pseudococcus erigeroni James.

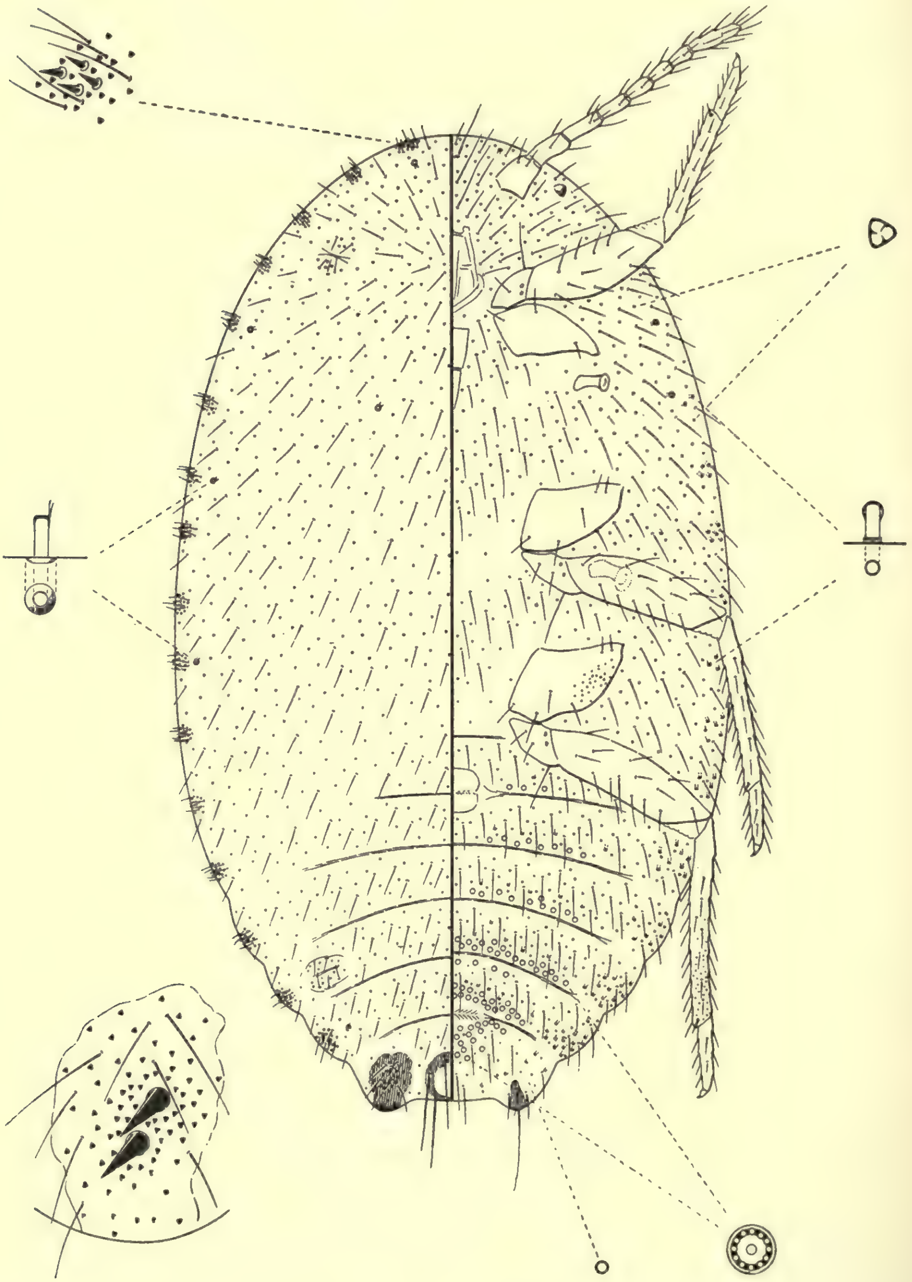

FIG. 6
Pseudococcus kikuyuensis James.

" The adult female elongate oval in outline ; coated with white wax ; two longitudinal rows of impressed dots divide the dorsum into a median and two lateral areas ; all marginal tassels long but anal pair disproportionately so and may exceed length of body ; segmentation clearly defined ; body colour dark red. Length of body 4·10 mm.; breadth 1·60 mm." (James, *l.c.*).

The following redescription is made from a long series of individuals from various hosts. The specimen illustrated is a young adult female collected on *Aberia caffra* on the ground of the Scott Agricultural Laboratory, Nairobi.

Mounted specimens elongate oval. Margin of body provided with seventeen pairs of cerarii. Anal lobe cerarii each built up with two large conical spines surrounded by numerous trilocular pores and seven to ten long auxiliary setae ; sclerotized area elongate, rather large. Spines of each pre-anal cerarius noticeably smaller and beset by several trilocular pores and four to six auxiliary setae. The spines of remaining cerarii tend to be progressively smaller anteriorly ; they normally occur in pairs, except on metathorax where one or two cerarii are provided with three spines, and on head with three and even four spines. Each cerarius is associated with a cluster of trilocular pores and four to six slender auxiliary setae. Ventral side of each anal lobe with an elongate irregularly-shaped sclerotized bar ; apical setae slender and about as long as those of anal ring ; subapical seta on each lobe much shorter. Multilocular disc pores distributed ventrally on six ultimate abdominal segments as follows : (IV) 3–8 ; (V) 13–21 ; (VI) 16–26 ; (VII) 32–47 ; (VIII) 35–58 ; (IX plus X) 27–37. They are arranged in linear rows along distal margin of segment involved, except on segments VIII and IX plus X. Dorsal tubular ducts with oral rim small. One duct is constantly present near each frontal (XVII), first abdominal (VIII) and penultimate (II) cerarius ; other ducts are occasionally associated with some of remaining cerarii, but their arrangement and number are variable. One or two ducts occur on submedian area of thorax. Ventral tubular ducts of oral collar type arranged in rather irregular lines in front of multilocular disc pores and in small groups along marginal area of abdomen and thorax. Trilocular pores not numerous and uniformly distributed. Circular disc pores very few, much smaller than trilocular ones. Dorsal setae rather long but slender ; ventral ones longer. Dorsal ostioles rather poorly developed, especially the anterior ones. Circulus large, membranous. Legs long and slender ; hind coxa and tibia with some small translucent pores. Antennae eight-jointed.

Pseudococcus longirostralis James (= ***Dysmicoccus brevipes*** (Ckll.))

Pseudococcus longirostralis James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 207.

One single specimen was available. The slide was labelled : " *Pseudococcus longirostralis* James, coll. No. 216, leaves of *C. arabica*, Bukoba, T.T., 27.i.1933, H. C. J." Although in rather poor condition it was possible to ascertain that this species is identical with the common pineapple mealybug, so that *Pseudococcus longirostralis* James is to be regarded as a new synonym of *Dysmicoccus brevipes* (Cockerell).

Pseudococcus masakensis James

(Text-fig. 7.)

Pseudococcus masakensis James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 208.

The material examined consisted of one slide with a single adult female labelled : "*Pseudococcus masakensis*, type, No. 303, roots of *Themeda triandra*, mile 60, Bukoba-Masaka Rd., 26.i.1933, H. C. J."

"Adult female broadly ovate ; thickly coated with white wax dorsally ; no distinctive pattern ; no tassels ; ovisac long and cottony. Length of adult female 1·40–2·00 mm.; breadth from 1·20–1·50 mm." (James, *l.c.*).

Mounted specimen very broadly oval, almost circular. Margin of body with seventeen cerarii, all with two robust, sharply pointed spines, except ocular (XVI) and frontal cerarii (XVII) which have three and four spines respectively. Spines of each anal lobe cerarius surrounded by a moderately large, ill-bordered sclerotized area and by a few trilocular pores and two or three short auxiliary setae. In remaining cerarii the spines are more of less of shape and size of those of anal lobe cerarii, but in each case the sclerotized area is very small and auxiliary setae are lacking. Ventral side of each anal lobe provided with sclerotized bar ; apical seta shorter than those of anal ring ; subapical setae four to five, all rather short but stout. Multilocular disc pores distributed ventrally on median, submedian and marginal areas of last seven abdominal segments. In segments anterior to genital opening they are mostly arranged in linear rows along distal margin of the segment involved ; their numbers are : (III) 10 ; (IV) 18 ; (V) 25 ; (VI) 27 ; (VII) 22 ; (VIII) 19 ; (IX plus X) 9. Tubular ducts with oral collar of two distinct sizes, both occurring mostly along ventral marginal area ; a few widely scattered on both sides of body. Trilocular pores rather few. Circular disc pores smaller than trilocular pores, very few. Dorsal setae very short, lanceolate ; some conical setae similar to those of marginal cerarii are inserted in median and submedian areas of abdomen and a few are sparsely distributed on head and thorax. Ventral setae much longer and stout. Posterior dorsal ostioles poorly developed ; anterior ones apparently absent. Circulus lacking. Legs rather short ; coxa of hind pair with some translucent pores. Antennae with seven joints.

Pseudococcus simulator James (= ***Pseudococcus muraltiae*** Brain)

Pseudococcus simulator James, 1933, *Bull. ent. Res.* **24** : 434.

Of this species neither the type nor paratypes could be found in the collections of the British Museum (Natural History), London. A request made to Dr. H. C. James, Jamaica, and to Prof. H. Morrison, Washington D.C., led to no better results as no slides exist in James' private collection or in the U.S. National collection of Coccidae in Washington. Fortunately on checking the old coccid collection of the Department of Agriculture, Nairobi, some slides which belong without any doubt to the series originally studied by James have been found.

The specimens which James used for the description of the species were actually collected by Mr. T. W. Kirkpatrick from coffee in the ground of the Scott Agricultural

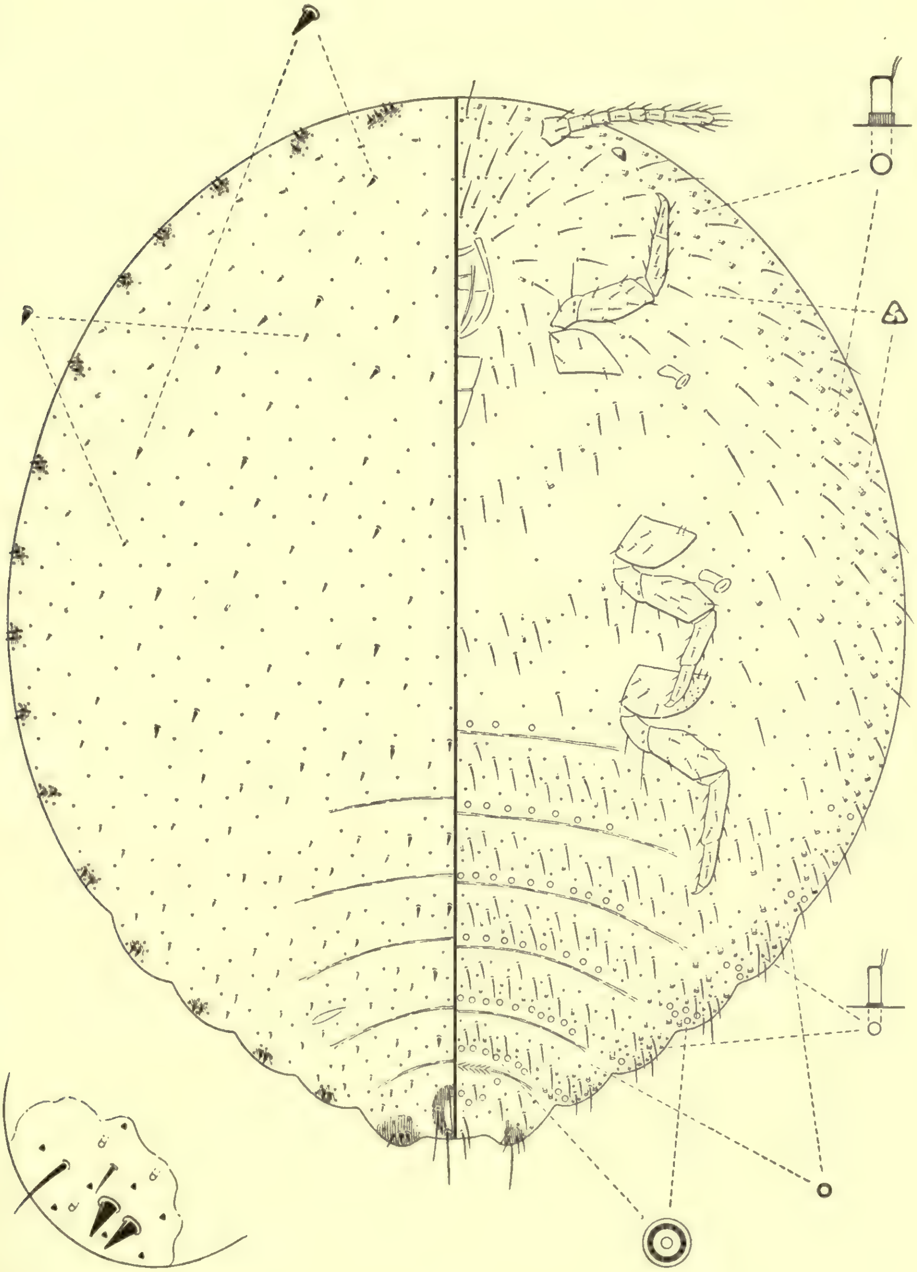

FIG. 7
Pseudococcus masakensis James.

Laboratory, Nairobi, in April, 1926. According to Kirkpatrick (1927 : 17) the species was then doubtfully identified by Green as *comstocki*, while Laing retained it as a new species. Indeed four of the slides at hand are labelled : " *Ps. comstocki*, S. A. L., on coffee, v.1926, T. W. K." One of them is marked " I. B. E. Coccid 1629 " and provided with the following label of the British Museum (Natural History), probably written by Laing himself : " *Pseudococcus* ? *comstocki* Kuw., det. by E. E. G., 31.x.1926—sp. n. Laing." All these specimens were restained and found identical with some previously identified by the writer from the description. The only point in which these specimens do not agree with the type series studied by James is that the collecting data is given as May, 1926 instead of April, 1926, which may well be explained as an accidental mistake. Seven more slides have the following label : " *Ps. comstocki*, Thika, (P. W. Trench), viii.1926, K." and they certainly were part of the batch collected later by Kirkpatrick as mentioned by James in his work. Even these agree with James' description.

They are all therefore regarded as part of James' type material and one of those collected in Thika will be deposited in due course in the British Museum (Natural History), London. Another specimen also of the Thika series will be sent to the U.S. National collection of Coccidae, Washington D.C.

Specimens of *Ps. simulator* were compared with two paratypes of *Ps. muraltiae* Brain in the collection of the British Museum (Natural History). Although both specimens were in part distorted and not well cleaned of the body content, it was possible to see that the two species are identical in all structures of major taxonomic importance. In Brain's paratypes it was not possible to detect the circulus, because it was concealed by segmental folds, yet in a series of specimens recently received from South Africa, this character is clearly visible though faintly marked as is the case in *simulator*. *Ps. simulator* then is here sunk as a synonym of *Ps. muraltiae* Brain and its identity will be dealt with in a further paper treating all the Pseudococcidae described by Brain from South Africa.

Rhizoecus albus James

(Text-fig. 8.)

Rhizoecus albus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 212.

One slide containing one single adult female in fairly good condition was seen. It bore the following data : " *Rhizoecus albus* sp. n., type, No. 376, roots of *Panicum maximum* Jacq., Baraha Rd., Mombasa, 19.viii.1933, H. C. J."

" Adult female elongate ; dusted with white wax ; short anal tassels only ; colour of the body content white ; ovisac not observed. Length of adult female from 1·40–2·10 mm.; breadth from 0·60–1·50 mm." (James, *l.c.*).

Body of mounted specimen rather broadly oval. Anal lobe cerarii each with three long robust setae surrounded by an elongate moderately sclerotized area which encloses also a cluster of trilocular pores and a few short auxiliary setae. Multilocular disc pores, tubular ducts and circular disc pores entirely absent. Tritubular ducts moderately large ; on dorsum they are mostly arranged along marginal and median areas ; on venter the marginal series is confined to some of abdominal segments ;

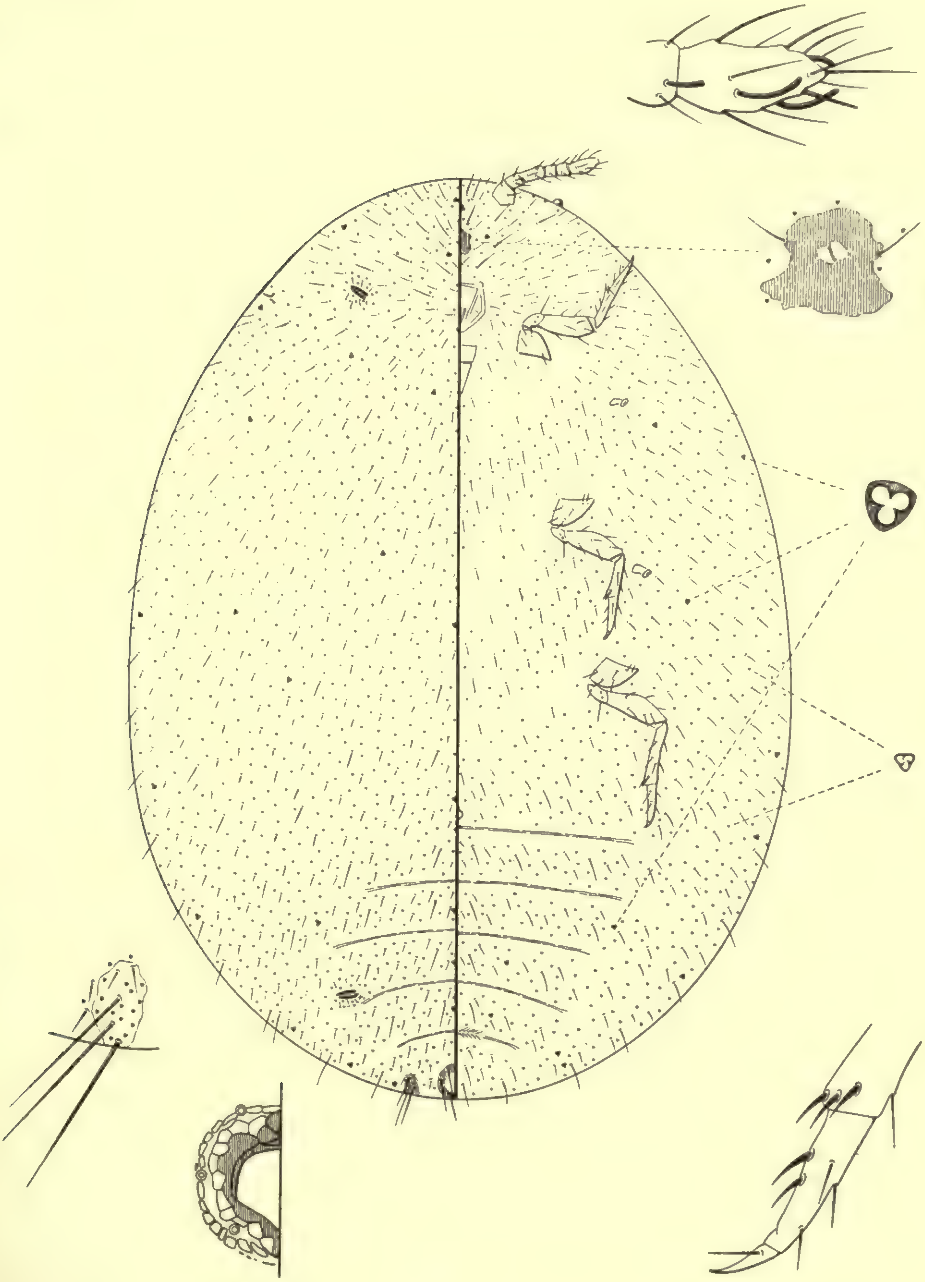

FIG. 8

Rhizoecus albus James.

one tritubular duct is associated at some distance with each stigmatic opening; a few others are sparsely distributed on both sides of body. Trilocular pores fairly numerous and uniformly distributed. Anterior and posterior dorsal ostioles having a cluster of trilocular pores and three or four small setae; lips slightly chitinized. Circulus small, inserted in a short truncate cone near posterior margin of (IV) abdominal segment. Legs well developed; ungual and tarsal digitules slender, finely pointed; distal end of tibia and inner margin of tarsus provided with robust, curved spines; coxa of all legs with three large, irregularly shaped fenestrations on ventral side. Ventral cephalic plate slightly chitinized and having two small clear areas more or less at middle. Anal ring entire, set close to apex of abdomen; anal ring setae six, all similar to those of anal lobe cerarii. Antennae well developed, six-jointed; apical joint with one stout straight and three falcate sensory setae; pre-apical joint with single falcate seta, smaller. Ventral and dorsal setae not numerous, small, except a few along ventral margin of abdomen which are longer.

Rhizoecus angustus James

(Text-fig. 9)

Rhizoecus angustus James, 1935, *Bull. ent. Res.* **26** : 381.

Two slides containing a single specimen were available for examination. One of them was a young adult female in fairly good condition labelled: "*Rhizoecus angustus* sp. n., No. 198, roots of *Themeda triandra* Forsk., Elgon Downs, 2.xii.1932, slide 3, H. C. J." This specimen was used for the accompanying figure. The second specimen was labelled: "*Rhizoecus angustus* sp. n., co-type, roots of *Leonotis nepetaefolia*, Ruiru, Kenya, 27.viii.1932, H. C. J." This specimen presented the prosoma partly distorted.

"Adult female vermiform; segmentation clearly defined; derm dusted with white powdery wax; no tassels; ovisac cottony; body content milky white. Length of the body 1·50–1·80 mm.; breadth 0·70–0·73 mm." (James, *l.c.*).

Mounted specimens elongate elliptical. Anal lobe cerarii each with three rather slender setae, three or four small auxiliary ones and a few trilocular pores; areas about cerarii not sclerotized. Multilocular disc pores present on both sides of body; on the abdomen arranged in transverse segmental rows, except on dorsum of last three segments which are apparently devoid of them; a few others widely scattered on prosoma. Tubular ducts entirely absent on specimen from roots of *Themeda triandra*, while on specimen from roots of *Leonotis nepetaefolia* a single small tubular duct of oral collar type occurs on submarginal ventral area of (VIII) abdominal segment. Circular disc pores absent. Tritubular ducts rather large. On dorsum they are arranged in submarginal and median series; on venter one tritubular duct is associated with each stigmatic opening; one occurs in front of ventral cephalic plate, and one on submarginal area of (IV), (VI) and ultimate abdominal segments. Trilocular pores not numerous and evenly distributed. Anterior and posterior dorsal ostioles small, lips slightly chitinized. Circulus small, inserted in a short truncate cone near distal margin of (IV) abdominal segment. Legs all well developed

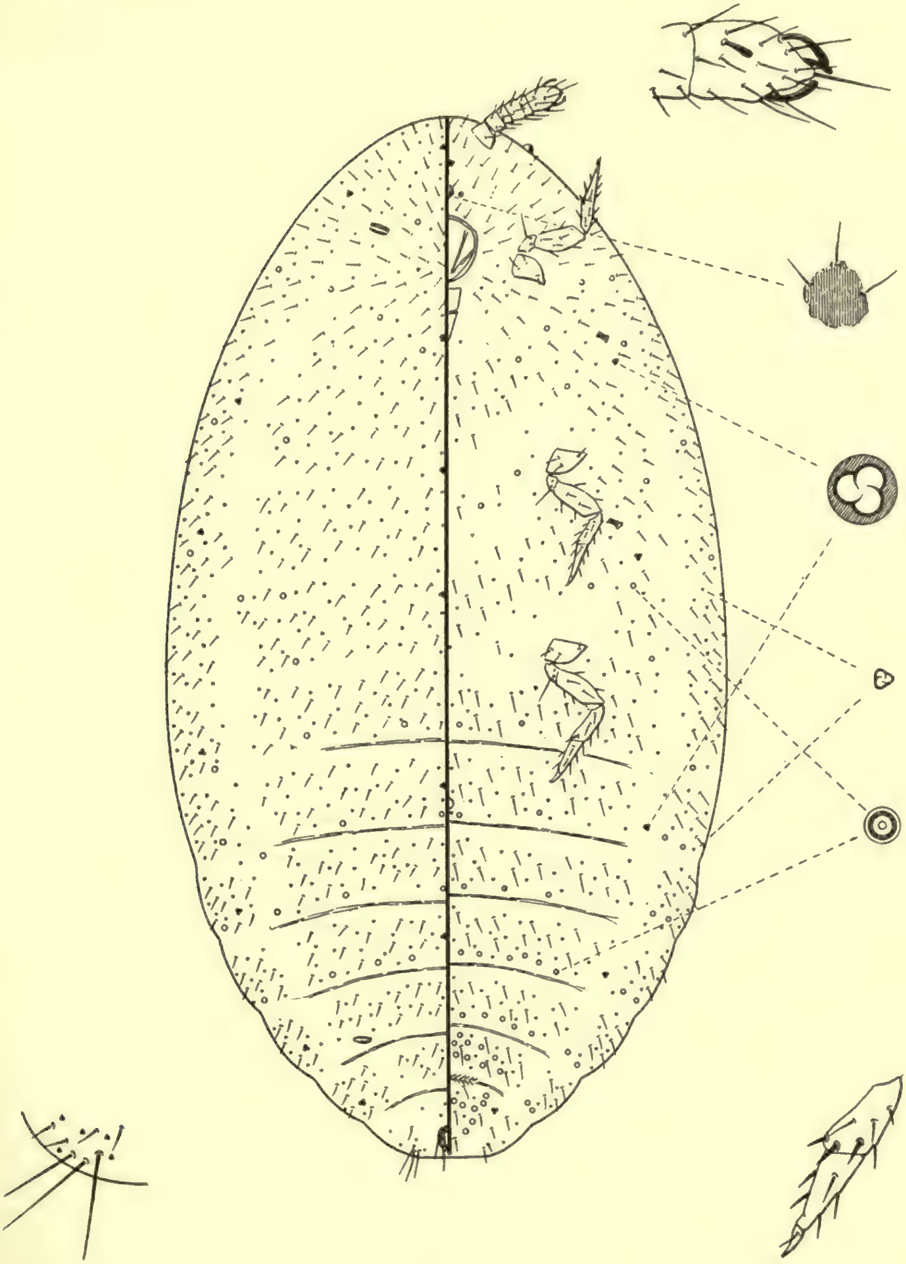

FIG. 9
Rhizoecus angustus James.

but rather small ; ungual digitules finely pointed ; hind tibia with two large subcircular vacuoles on dorsal side. Ventral cephalic plate irregularly shaped and very slightly chitinized. Anal ring set close to extremity of abdomen, entire, built up with few elongate cells ; anal ring setae six, all somewhat longer than those of anal lobe cerarii. Antennae short, stout, six-jointed ; apical joint provided with three large and one small falcate sensory setae. Dorsal and ventral setae few and small. There is a narrow submarginal band on both sides of the body, without any setae or pores.

Rhizoecus geniculatus James

(Text-fig. 10)

Rhizoecus geniculatus James, 1935, *Bull. ent. Res.* **26** : 379.
Rhizoecus makoboensis James, 1935, *Bull. ent. Res.* **26** : 380.

One slide containing an adult female in rather poor condition was labelled : " *Rhizoecus geniculatus* sp. n., co-type, roots of *Abutilon usambarense*, Getitu, Nyeri, 21.x.1932, H. C. J." Another slide with a single specimen was used for the accompanying figure. This slide was labelled as follows: " *Rhizoecus geniculatus* sp. n., No. 183, from roots of couch grass,[1] Eldoret, 1.xii.1932, co-type, H. C. J."

" Adult female elongate, vermiform ; segmentation distinct ; derm powdered with white wax ; anal tassels short, marginal tassels absent ; body content milky white in colour, mature female enclosed in white waxen cells. Length of the body 1·38–2·00 mm.; breadth 0·63–1·02 mm." (James, *l.c.*).

Mounted specimens elongate elliptical. Each anal lobe cerarius formed by three rather long slender setae, with one or two small auxiliary ones. Multilocular disc pores fairly numerous and widely scattered on both sides of body. Tubular ducts, circular disc pores and tritubular ducts entirely absent. Other very small unitubular ducts occur on venter and dorsum, particularly along marginal and submarginal areas. As they are heavily chitinized their internal structure is obscure. Trilocular pores few, scattered. Dorsal ostioles having lips slightly chitinized and devoid of trilocular glands or setae. Circulus inserted in small truncate chitinized cone, near posterior margin of (IV) abdominal segment. Legs well developed but small ; ungual digitules slightly knobbed at apex. Ventral cephalic plate irregularly shaped, elongate, moderately chitinized and with two small fenestrations near base. Anal ring set close to abdominal end, entire, built up with large elongate cells ; anal ring setae six, all attaining more or less the same length as those of anal lobe cerarii but more robust. Antennae short, stout with six joints ; apical joint with four sensory falcate setae of different size. Dorsal and ventral body setae few and very small.

Rhizoecus globosus James

(Text-fig. 11)

Rhizoecus globosus James, 1935, *Bull. ent. Res.* **26** : 382.

Two slides examined : one containing a very old adult female, badly distorted and broken, labelled : " *Rhizoecus globosus* sp. n., co-type. No. 181, roots of *Themeda*

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[1] Couch grass or African couch grass = *Digitaria abyssinica.*

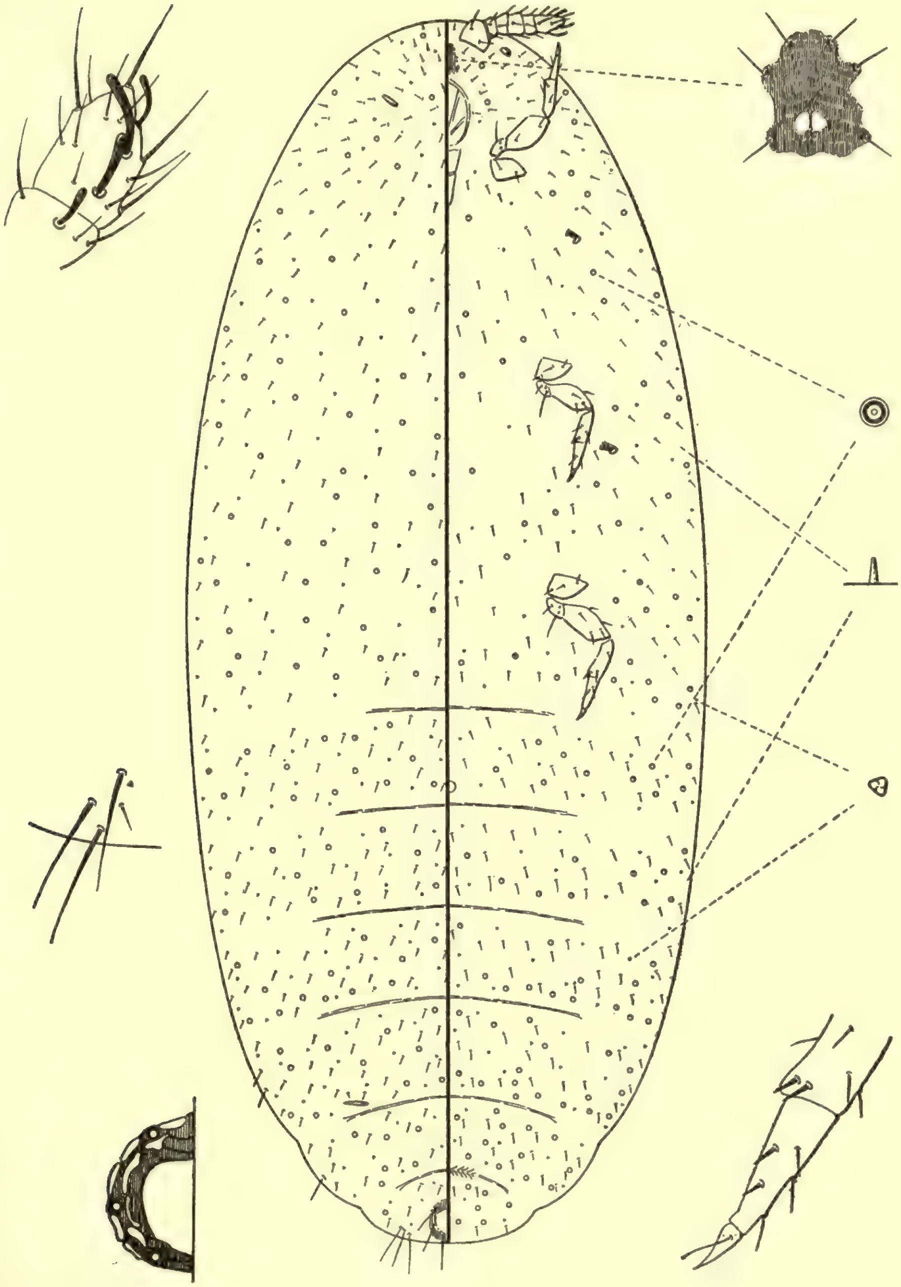

FIG. 10
Rhizoecus geniculatus James.

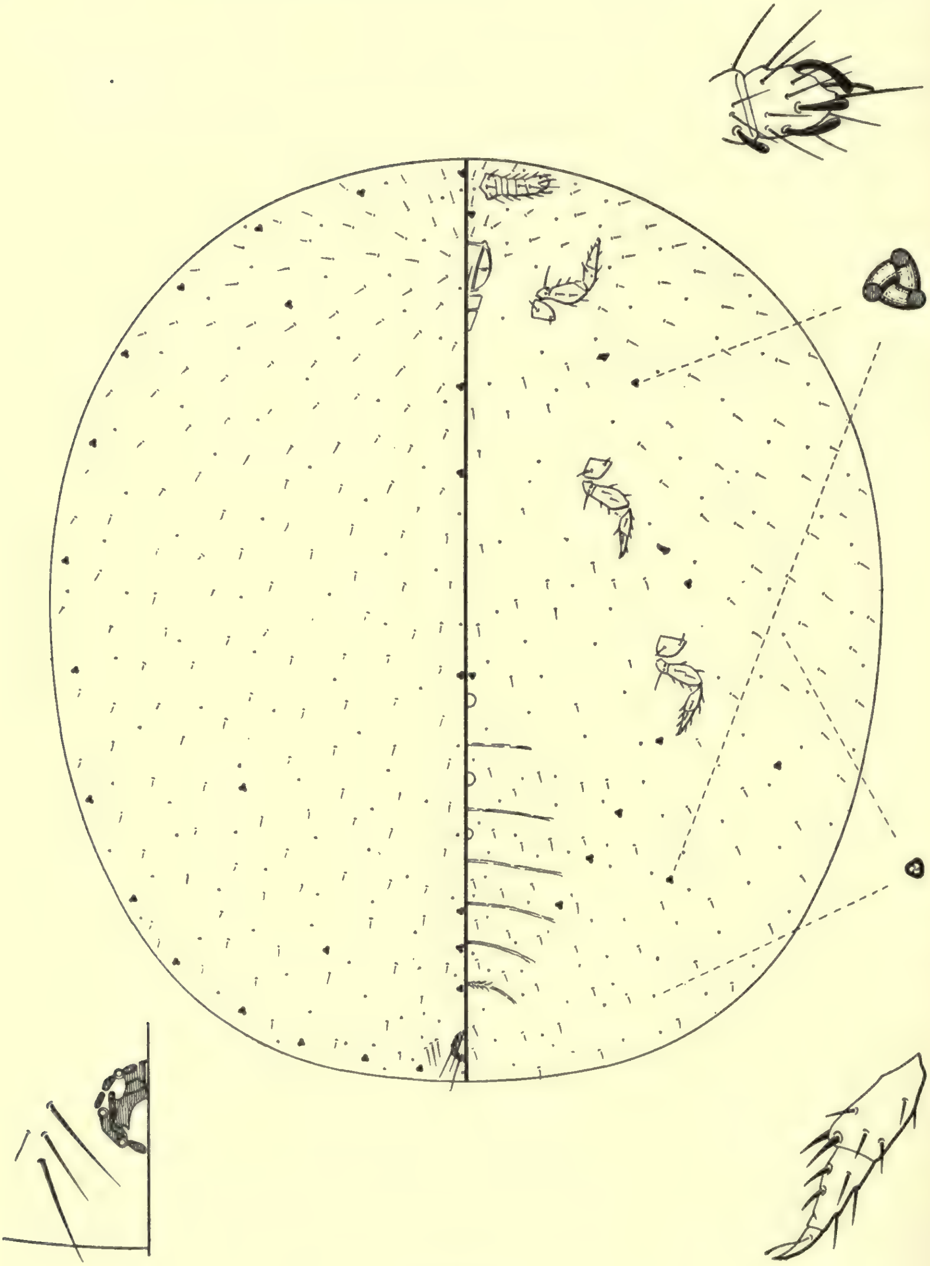

Fig. 11
Rhizoecus globosus James.

triandra Forsk., Kitale, 1.xii.1932, H. C. J." The other slide with four specimens, three of which distorted and partly broken; the fourth entire but attacked by fungi which obscure some of the structures and body segmentation. Its label was as follows: "*Rhizoecus globosus* sp. n., roots of *Themeda triandra* Forsk., Kitale, Kenya, 1.xii.1932, H. C. J."

"Adult female almost circular in outline, convex dorsally and flattened ventrally; indication of segmentation almost obliterated; ground colour milky-white; derm dusted with white powdery wax; enclosed in a white felted ovisac; oviparous, the eggs white. Length of the body 1·36–1·50 mm.; breadth 1·13–1·30 mm." (James, *l.c.*).

In mounted specimens the body is almost circular; skin membranous, except in one specimen which was slightly chitinized; body segmentation partly visible on venter only. Anal lobe cerarii each with three slender setae and a small auxiliary one; areas about cerarii not sclerotized. Multilocular disc pores, tubular ducts and circular disc pores absent. Tritubular ducts large; on dorsum they are mostly arranged on marginal and median areas; on venter one duct is closely associated with stigmatic openings and in front of first circulus; others occur on the submedian and submarginal areas of abdomen; one just in front of mouth parts. Trilocular pores few, widely scattered. Circuli three, all more or less same size, circular, flat, with rim chitinized and surface granulated. Dorsal ostioles apparently absent. Legs very small; ungual digitules slightly knobbed at apex. Ventral cephalic plate apparently absent. Anal ring set near abdominal end and formed by few elongate cells; anal ring setae six, more robust that those of anal lobe cerarii. Antennae small, stout, six-jointed; apical joint with three falcate and one slender curved sensory setae; pre-apical joint with a single falcate seta, smaller. Body setae few, small and widely scattered all over the dorsum and venter.

Rhizoecus graminicola James

(Text-fig. 12)

Rhizoecus graminicola James, 1936, *Trans. R. ent. Soc. Lond.* **85**: 210.

One slide with a single specimen in fairly good condition was available for examination. The slide was labelled: "*Rhizoecus graminicola* sp. n., type, No. 404, grass roots, Kilindini, 22.viii.1933, H. C. J."

"Adult female elongate; ovisac cottony and envelops female; derm powdered with white wax. Length of adult 2·5–2·80 mm.; breadth 1·20–1·50 mm." (James, *l.c.*).

Body of mounted type very elongate elliptical. Anal lobe cerarii each provided with a moderately long robust seta and two smaller ones set widely apart; areas about cerarii not chitinized and without groupings of trilocular pores. Multilocular disc pores not numerous and present only on dorsal and ventral sides of last abdominal segments; on segments anterior to genital opening they are arranged in loose rows along distal margin only. Tubular ducts of oral rim type very small and characterized by having the opening elliptical; abundant on both sides of body. Circular disc pores absent. Tritubular ducts also absent, their place being taken by a few very

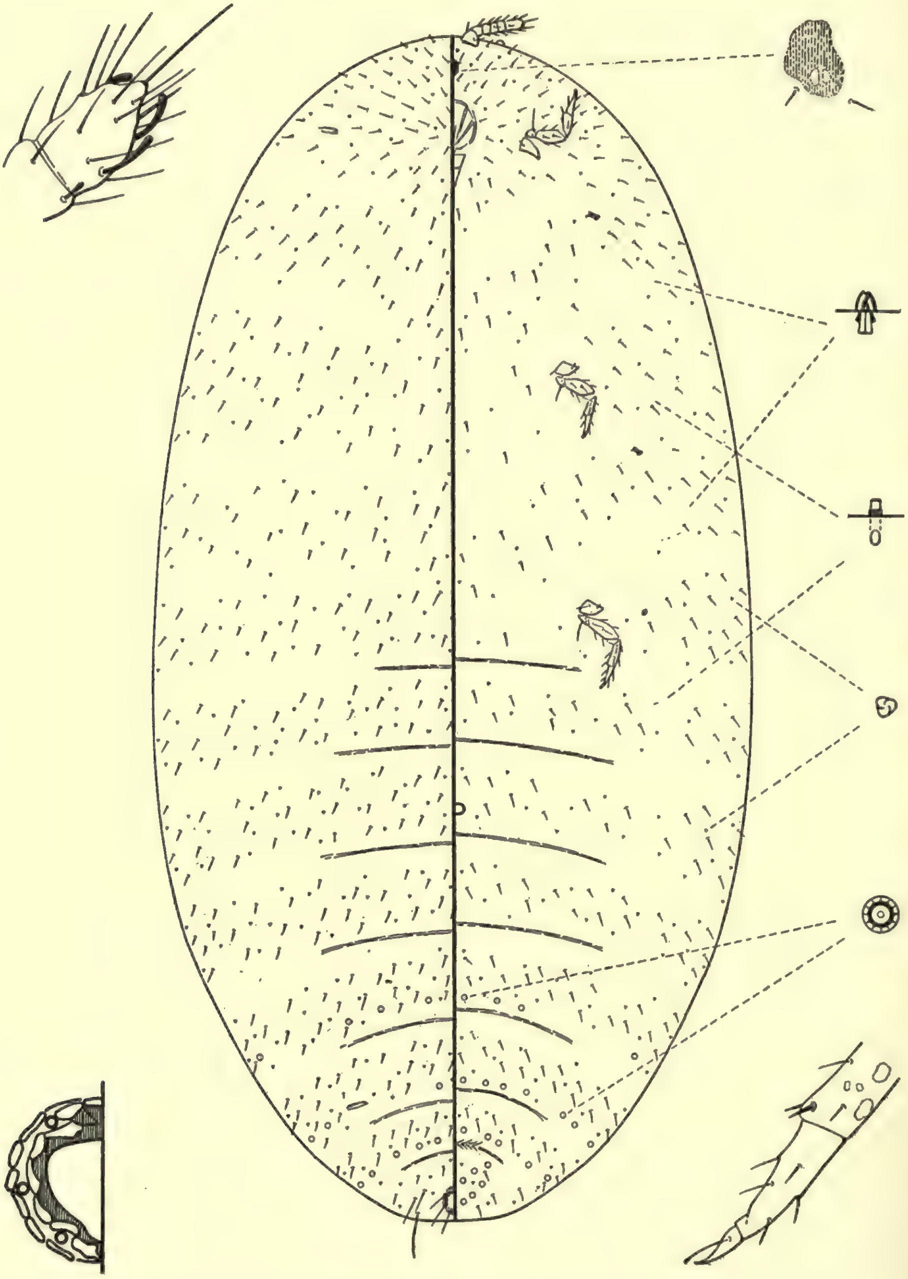

FIG. 12
Rhizoecus graminicola James.

small bitubular ones distributed as follows: on dorsum one occurs on submarginal area of (IV), (VI) and (VIII) abdominal segments and three on median area of thorax and head; on venter only two which are associated with stigmatic openings. Trilocular pores few and sparsely distributed on both surfaces. Anterior and posterior dorsal ostioles very poorly developed, with membranous lips. Circulus small, flat, with rim heavily chitinized, and inserted near posterior margin of (IV) abdominal segment. Legs small, with ungual digitules very slightly knobbed at apex; dorsal side of hind tibia with some irregularly-shaped fenestrations of various sizes. Ventral cephalic plate small, ill-bordered and poorly chitinized, having two small clear areas near base. Anal ring at apex of abdomen, entire, built up with few elongate cells; anal ring setae six. Antennae small, geniculate, with six joints; apical joint with four sensory setae, one straight and stout and three falcate; another falcate sensory seta but much smaller is inserted on pre-apical joint. Both ventral and dorsal setae few and small.

Rhizoecus immsi James

(Text-fig. 13)

Rhizoecus immsi James, 1935, *Bull. ent. Res.* **26**: 383.

One slide containing a rather young adult female was labelled: "*Rhizoecus immsi* James, No. 358, roots of *Mariseus magnas*,[1] mile 50 Jinja-Tororo Rd., 1.ii.1933, H. C. J." Although the label does not indicate whether the specimen is the type or a paratype, and James does not mention the number of specimens studied, it seems clear enough that the specimen at hand belongs to the series studied by James, as the collecting data are the same as those published in his original paper. This specimen although somewhat distorted was used for the accompanying figure. Another slide also containing a single adult female badly distorted was labelled: "*Rhizoecus immsi* sp. n., roots of *Sporobolus philippi*,[2] Bukoba, T.T., 29.i.1933, H. C. J."

"Adult female vermiform; body content white; derm powdered with white wax; ovisac not observed. Length 1·38 mm.; breadth (under compression) 0·82 mm." (James, *l.c.*).

Body elongate oval (ex *Mariscus magnus*) or broadly oval (ex *Sporobolus filipes*), membranous. Each anal lobe cerarius formed by three long, robust setae, two of which—the anterior ones—surrounded by a small elongate, moderately sclerotized area, enclosing also a few trilocular pores. Multilocular disc pores mostly arranged in transverse rows on ventral side of abdominal segments; a few widely scattered all over the body. Small tubular glands apparently of collar type but having part of duct projecting externally from the body skin are abundant on ventral side of last abdominal segments. Circular disc pores absent. Tritubular ducts large; on dorsum they are arranged in a submarginal series; on venter the submarginal series is restricted to abdomen only; three occur on submedian area of segments VI–VIII; one is associated with each stigmatic opening and one is inserted between

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[1] A mis-spelling for *Mariscus magnus* C. B. Clarke (Cyperaceae).

[2] The specific name must be read as *filipes*. Furthermore the genus *Sporobolus* does not belong to Compositae as stated by James, but to Gramineae.

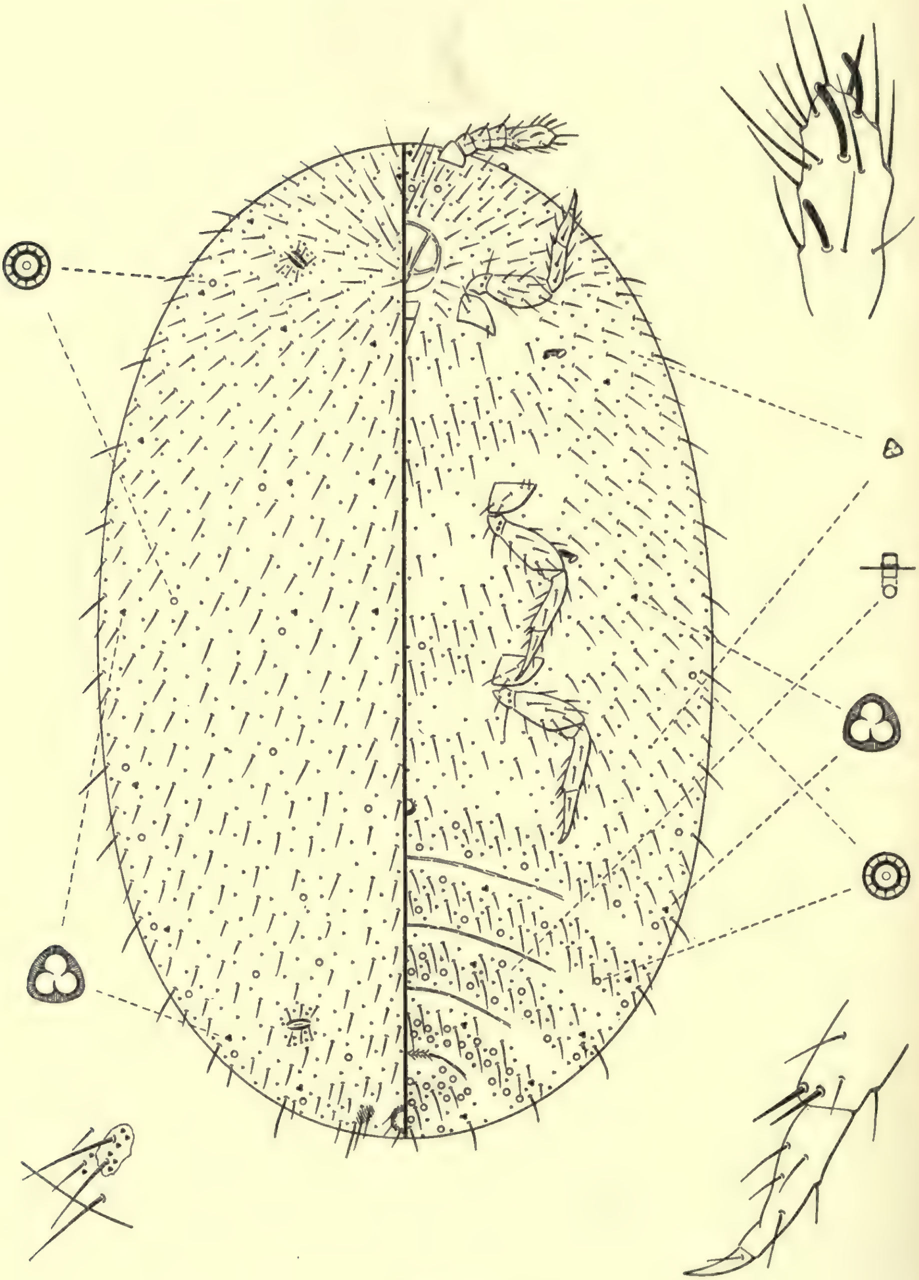

FIG. 13
Rhizoecus immsi James.

antennae. Trilocular pores evenly distributed, not numerous. Both pairs of dorsal ostioles well developed, having a cluster of trilocular pores and three or four small setae; lips strongly chitinized. Circulus subcircular, with granulated, slightly chitinized surface and inserted in a truncate conical prominence. Legs well developed; ungual digitules small, finely pointed. Ventral cephalic plate apparently absent. Anal ring set close to abdominal extremity, entire, with elongate cells; anal ring setae six. Antennae short, stout, five-jointed, geniculate; apical joint provided with four falcate sensory setae,[1] three of equal length, one noticeably smaller; another seta apparently sensory, differs from all others by being conical. Setae of both sides of body rather long and robust; other longer and more robust setae are inserted all along ventral and dorsal marginal areas.

Rhizoecus incrassatus James

(Text-fig. 14)

Rhizoecus incrassatus, James, 1935, *Bull. ent. Res.* **26** : 383.

The material examined was a single very old adult female, in poor condition being distorted and in part broken. It was labelled as follows: "*Rhizoecus incrassatus* sp. n., holotype, coll. No. 97, roots of *Pennisetum clandestinum*, Kiamwere, nr. Nyeri, Kenya, 20.x.1932, H. C. J."

"Adult female almost circular in outline, highly convex dorsally and flattened ventrally, enclosed in waxen cell; derm powdered with white wax; no tassels; ground colour milky-white. Length 1·17–1·84 mm.; breadth 1·00–1·47 mm." (James, *l.c.*).

Body of mounted specimen very broadly rounded, almost circular; dermis moderately chitinized; body segmentation not visible. Anal lobe cerarii each formed by three slender setae and two or three trilocular pores; area about the setae not sclerotized. Multilocular disc pores, circular disc pores and tubular ducts absent. Tritubular ducts on dorsum arranged mostly in a marginal series and along median area; on venter one duct is associated with each stigmatic opening and anteriorly to circuli; a few others occur on submedian and submarginal areas of abdomen. Trilocular pores very few and widely scattered. Dorsal ostioles apparently absent. Circuli two, small, flat. Legs very small with ungual digitules finely pointed. Ventral cephalic plate apparently lacking. Anal ring entire, set near abdominal end; anal ring setae six, all about the same size as those of anal lobe cerarii. Antennae small, stout, six-jointed; apical joint with four sensory setae, three falcate one straight; pre-apical joint with another falcate sensory seta, but smaller. Body setae very small and apparently present only on head and last abdominal segments.

Rhizoecus makoboensis James (= ***Rhizoecus geniculatus*** James)

Rhizoecus makoboensis James, 1935, *Bull. ent. Res.* **26** : 380.

One slide with a single specimen was seen. It was labelled: "*Rhizoecus makoboensis* sp. n., holotype, Athi River Station, *Cynodon plectostachyum* Pilg, 31.x.1932,

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[1] In the accompanying figure only three sensory setae are illustrated, one being inserted on the opposite side.

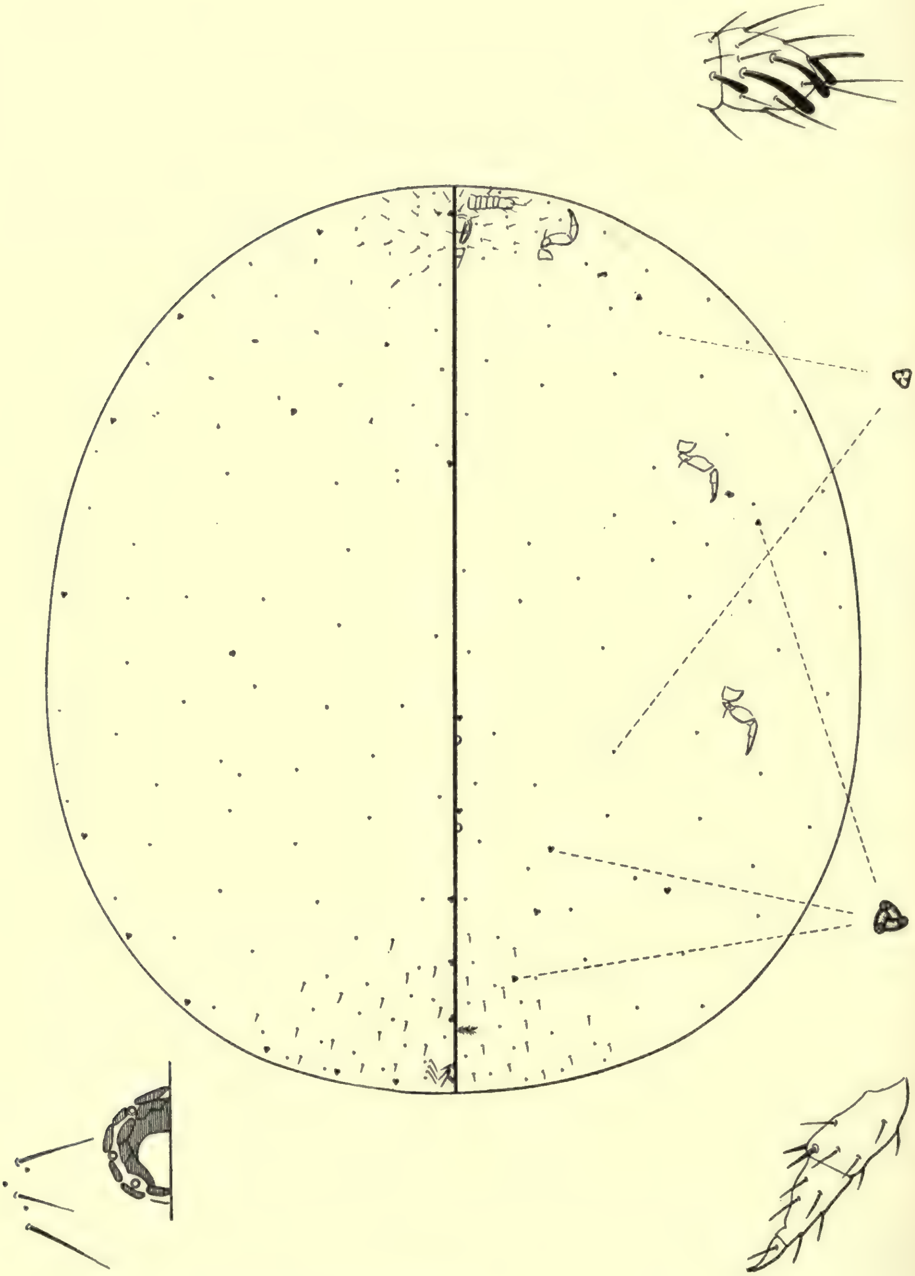

FIG. 14
Rhizoecus incrassatus James.

H. C. J." Although the specimen was not in very good condition, it was possible to ascertain that all the body structures were identical with those of *R. geniculatus* described by James in the same paper. Therefore *makoboensis* is here sunk as a synonym of *geniculatus* which has page precedence.

Ripersia glandulosa James

(Text-fig. 15)

Ripersia glandulosa James, 1935, *Bull. ent. Res.* **26** : 385.

Two slides have been seen, each with one adult specimen. One specimen labelled : " *Ripersia glandulosa* sp. n., co-type, roots of *Conyza volkensii* O. Hoff., Nyeri, Kenya, H. C. J." was an old adult female in poor condition. The second slide labelled: " *Ripersia glandulosa* sp. n., No. 104, roots of *Pennisetum clandestinum*, Gura River Bridge, 21.x.1932, co-type,[1] H. C. J." contained a fairly good specimen which was used for the accompanying illustration.

" The adult female broadly ovate in outline, covered with an even thick coat of white wax ; anal tassels only present ; ground-colour pale yellow. Length of the body 1·56—1·83 mm.; breadth 0·97–1·33 mm." (James, *l.c.*).

In mounted specimens the body very broadly oval, almost circular. Cerarii recognizable on anal lobes and on three preceding abdominal segments ; all built up with two conical, sharply-pointed spines, a few auxiliary setae and a cluster of trilocular pores. The spines of anal and pre-anal cerarii more or less of same size ; remainder tend to be noticeably longer. Anal lobes each provided ventrally with a long robust apical seta. Multilocular disc pores entirely absent.[2] Tubular ducts of oral rim type arranged in a marginal series on both sides of body ; a few widely scattered, without any apparent regular pattern. Tubular ducts with oral collar mostly distributed in transverse rows on ventral side of last five abdominal segments. Trilocular pores not very numerous and uniformly distributed. Circular disc pores large, with surface somewhat granulated ; a cluster of these pores occurs on the dorsal median area of abdominal segments V–VIII ; others are scattered on both sides of body. Both anterior and posterior dorsal ostioles well developed, with a grouping of trilocular pores and a few small setae on their lips ; lips not chitinized. Circulus transversally elongate, membranous. Legs well developed, stout ; hind tibia with numerous unusually large translucent pores on dorsal side ; tarsal digitules long and pointed ; ungual ones shorter and slightly knobbed. Antennae six-jointed, normal. Anal ring entire, of normal Pseudococcid type, set close to apex of abdomen. Setae of both sides of abdomen and those all along the margin of body long and robust ; remaining setae shorter and slender.

Ripersia hypoestis James

(Text-fig. 16)

Ripersia hypoestis James, 1935, *Bull. ent. Res.* **26** : 387.

Two slides were examined each containing a single specimen. One slide was labelled : " *Ripersia hypoestis* sp. n., No. 96, roots of *H. verticillaris*, Muringato

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[1] Written with pencil.

[2] James' statement that the species is provided with multilocular disc pores is erroneous. He certainly confused them with the circular disc pores, which in this species are unusually very large.

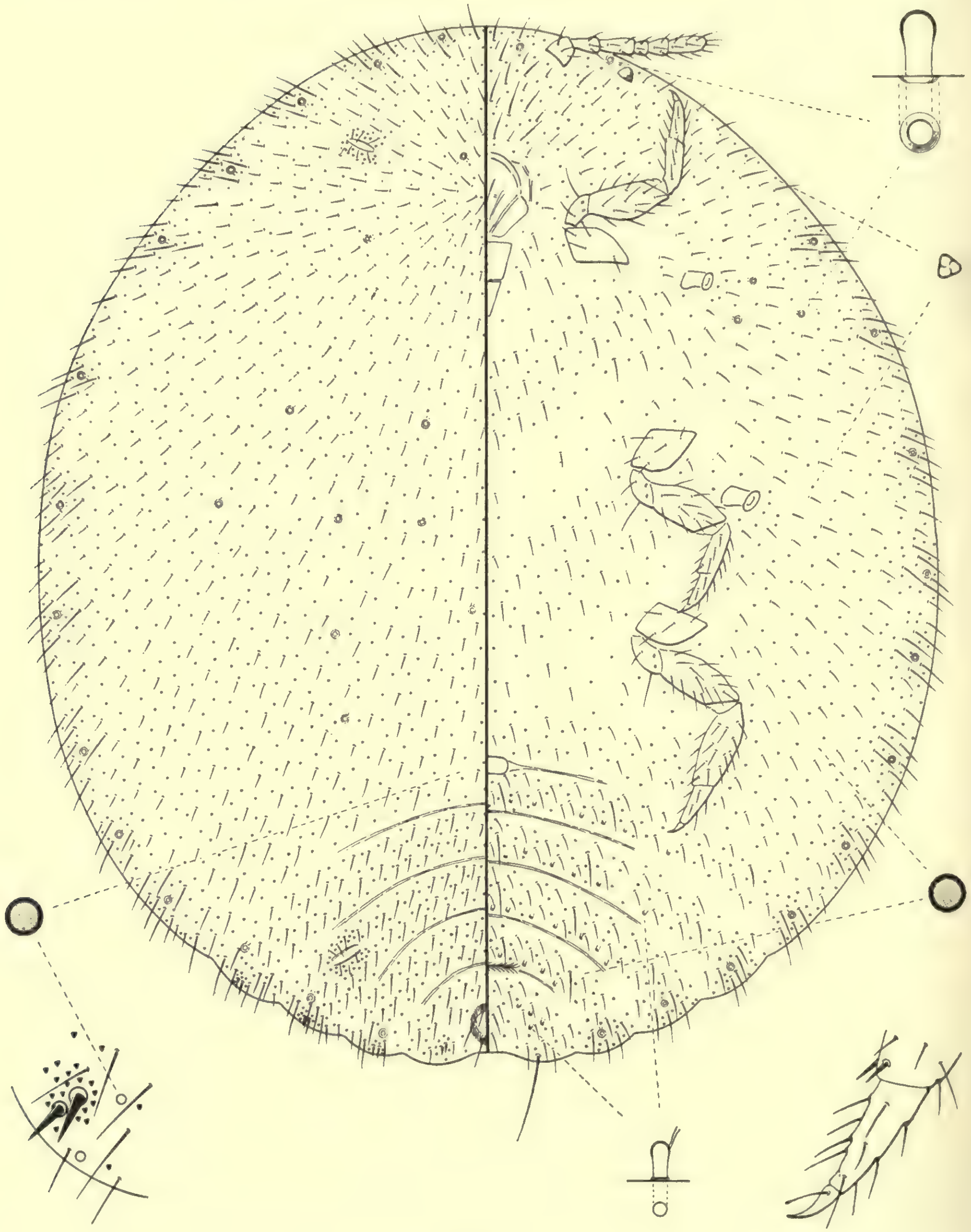

FIG. 15
Ripersia glandulosa James.

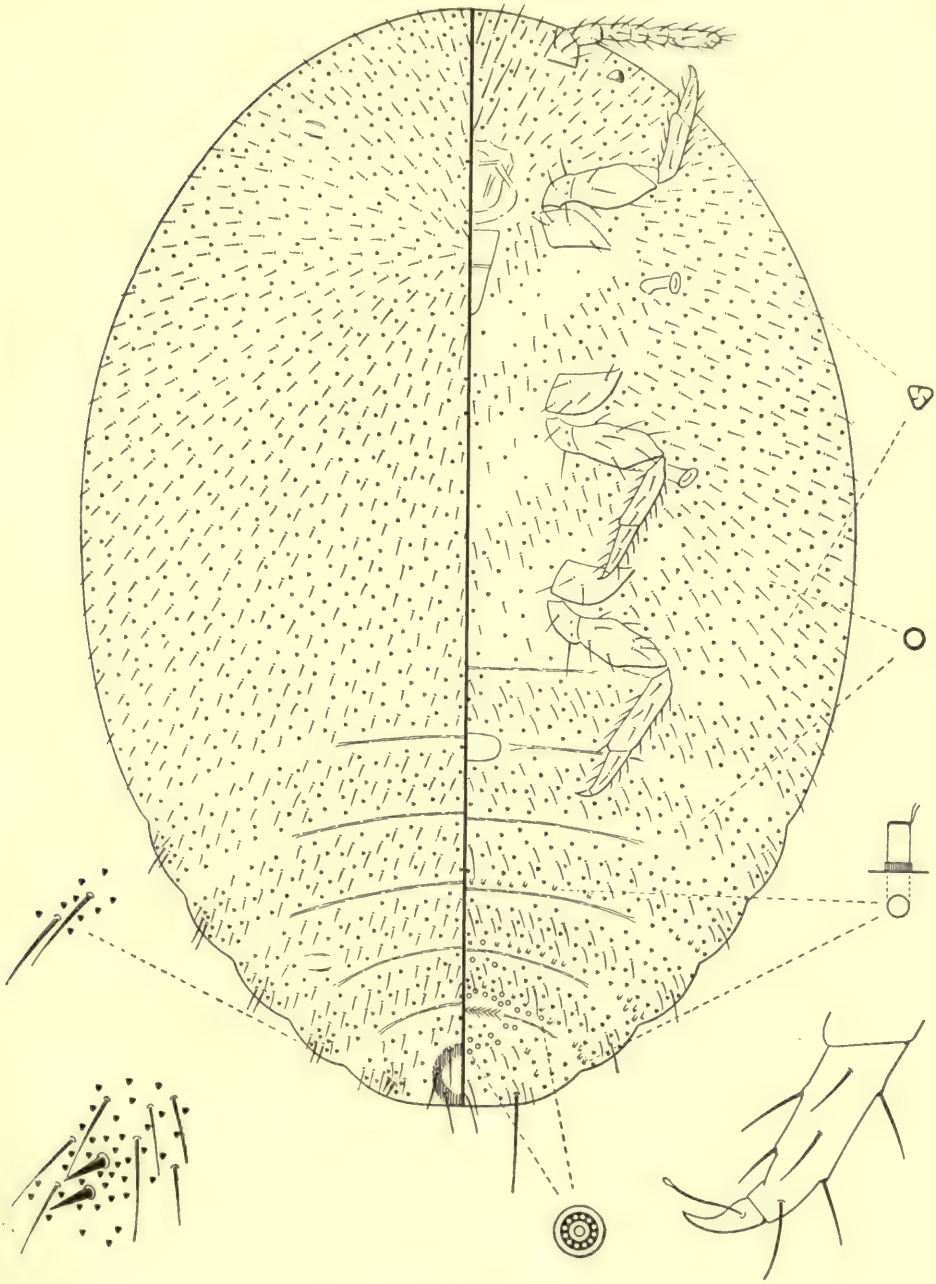

FIG. 16
Ripersia hypoestis James.

River, Nyeri, 30.x.1932, H. C. J." The second slide was an old adult female badly distorted labelled with the same collecting data and marked " co-type ".

" Adult female broadly ovate, with a thin covering of white wax; short anal tassels only; ovisac not seen; ground-colour pale yellow. Length of the body 1·80–2·30 mm.; breadth 1·60–1·80 mm." (James, *l.c.*).

Mounted specimens broadly oval. Each anal lobe cerarius represented by two conical spines and some slender auxiliary setae beset with several trilocular pores. The four pairs of cerarii anterior to the anal lobes are each built up with two robust setae which are noticeably longer than those of body and are surrounded by a cluster of few trilocular pores. Anal lobes ventrally each provided with a long robust seta. Multilocular disc pores few and arranged in three groups on ventral side of last abdominal segments as follows: (VII) 2; (VIII) 20; (IX plus X) 18. Tubular ducts with oral collar mostly distributed in transverse rows on venter of last four segments of abdomen. Trilocular pores numerous and uniformly distributed. Circular disc pores about the size of trilocular pores; they are few and widely scattered on both sides of body. Dorsal ostioles with lips very slightly chitinized, devoid of setae or trilocular pores. Circulus large and elongate transversally. Legs all well developed; tarsal digitules setiform; ungual ones knobbed at apex. Antennae with six joints. Anal ring with six setae, entire, set on dorsal extremity of abdomen. Both dorsal and ventral body setae rather short and slender, not very abundant.

Ripersia inaequalis James

(Text-fig. 17)

Ripersia inaequalis James, 1935, *Bull. ent. Res.* **26**: 384.

Two slides were seen. One contained three adult females all in poor condition labelled: " *Ripersia inaequalis* sp. n., roots of *Sporobolus philippi* (4), River Sumuru, Kenya, 25.viii.1932, H. C. J." The other contained a single specimen in fairly good condition, although partly distorted, and was marked as follows: " *Ripersia inaequalis* sp. n., No. 41, roots of *Sporobolus philippi*, Fort Hall Rd., River Sumuru, 25.viii.1932, 5,055 ft., H. C. J."

" Young adult females almost circular in outline; adults somewhat more elongate, dorsally highly convex, flattened ventrally; dorsally the waxy pattern gives the insect a speckled appearance; there are no tassels; ovisac small; ground-colour pale yellow. Length 1·80–2·07 mm.; breadth 1·39–1·90 mm." (James, *l.c.*).

Mounted specimens very broadly oval, almost circular. Marginal cerarii recognizable only on last five abdominal segments, each formed by two very robust long setae of different length beset by a group of four to eight trilocular pores. Anal lobes each provided ventrally with a long stout apical seta. Multilocular disc pores and tubular ducts entirely absent. Trilocular pores moderately numerous and evenly distributed. Circular disc pores only a little smaller than trilocular pores with surface somewhat granulated; apparently they are present on dorsal and ventral sides of prosoma only, and are widely scattered. Dorsal ostioles rather inconspicuous having lips moderately chitinized. Circulus lacking. Legs well developed; tarsal digitules long and setolose; ungual ones knobbed; hind legs with some translucent

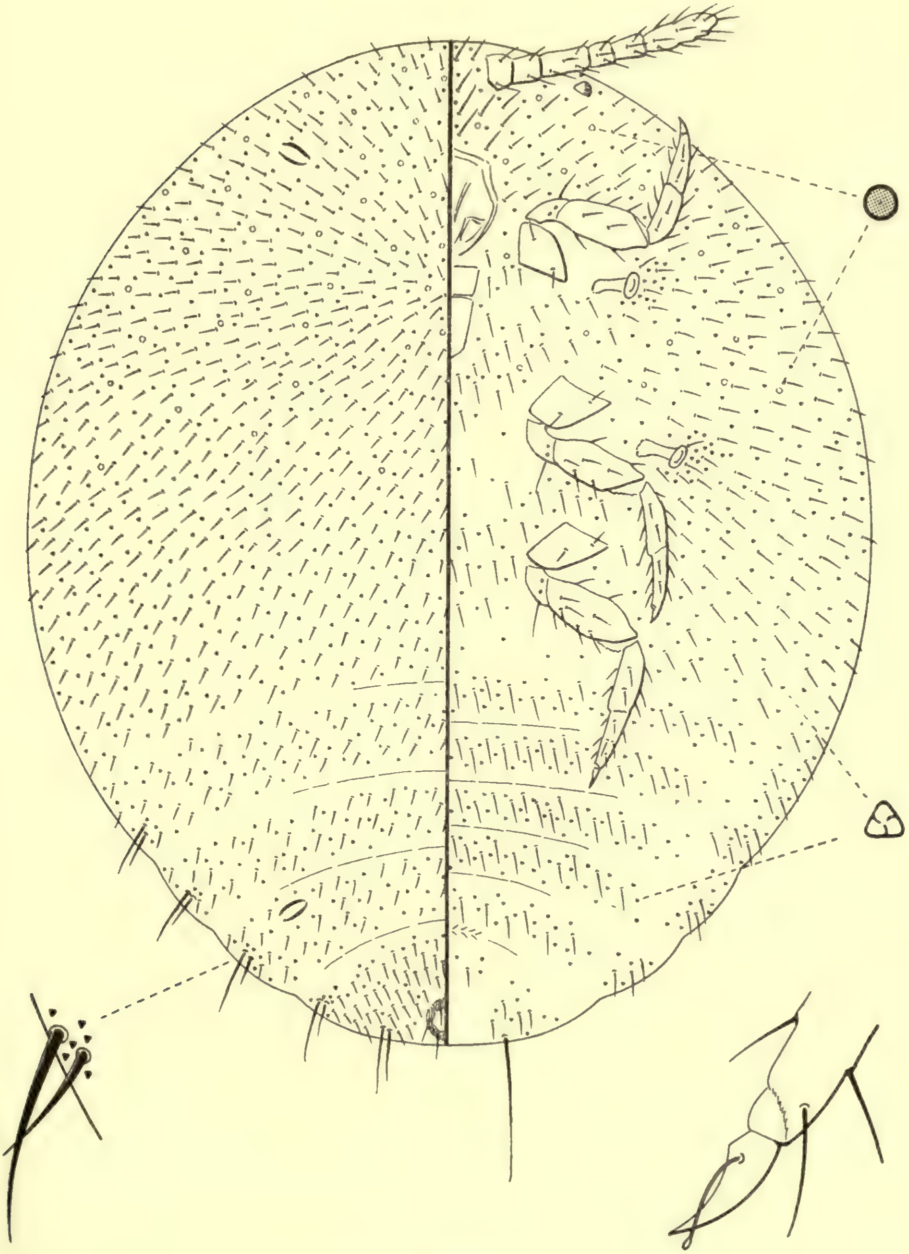

FIG. 17
Ripersia inaequalis James.

pores on tibia and femur. Antennae rather long, stout, six-jointed. Anal ring with six setae, entire. Dorsal setae somewhat smaller than those of venter; setae more numerous on dorsal side of the last abdominal segment than elsewhere.

Ripersia littoralis James

(Text-fig. 18)

Ripersia littoralis, James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 213.

The material examined was a rather fine specimen labelled : " *Ripersia littoralis* sp. n., roots of grasses (undet.), Mtwapa Rd., Mombasa, 22.viii.1933, H. C. J." Another slide containing two females badly distorted and in part broken was labelled with the following data : " *Ripersia littoralis* sp. n., type, roots of grasses, Mtwapa Rd., Mombasa, 22.viii.1933, H. C. J."

" Adult female broadly ovate ; enclosed during life in a white silky ovisac ; tassels absent ; body content greenish-brown." (James, *l.c.*).

Mounted specimens broadly elliptical. With only one pair of cerarii, those of anal lobes which are each formed of two conical, sharply-pointed spines and some very robust long auxiliary setae, without groupings of trilocular pores. Ventrally the anal lobes are each provided with a moderately long apical seta. Multilocular disc pores numerous and widely distributed all over both sides of body. Tubular ducts with oral collar of two different sizes, both abundant and scattered on both surfaces. Trilocular pores very few and widely distributed. Circular disc pores apparently absent. Dorsal ostioles, particularly the anterior ones, very poorly developed. Two circuli, both elongated transversely, of same size, membranous. Legs short, slender ; tarsal digitules spiniform ; ungual ones knobbed at apex ; hind coxa with some small translucent pores. Anal ring with six setae, entire. Antennae with six or seven joints. In one specimen with six-jointed antennae, one antenna showed a pseudo-articulation on third joint ; in another specimen with seven-jointed antennae one pseudo-articulation was visible on apical joint.

Ripersia rotundata James

(Text-fig. 19)

Ripersia rotundata James, 1935, *Bull. ent. Res.* **26** : 388.

Two slides are in the British Museum (Natural History), both with a single adult female. One was labelled : " *Ripersia rotundata* sp. n., coll. 95, roots of *Digitaria abyssinica* Staff., Kiamwere; Nyeri, 20.x.1932, H. C. J." The label of the second slide was : " *Ripersia rotundata* sp. n., co-type, from roots of *Digitaria abyssinica* Staff., Kiamwere, Nyeri, 20.x.1932, H. C. J."

" Adult female round and plump ; waxy coating sparse ; no tassels ; ovisac yellowish and voluminous ; body content deep yellow. Length of body 1·50–3·40 mm.; breadth 2·10–2·70 mm." (James, *l.c.*).

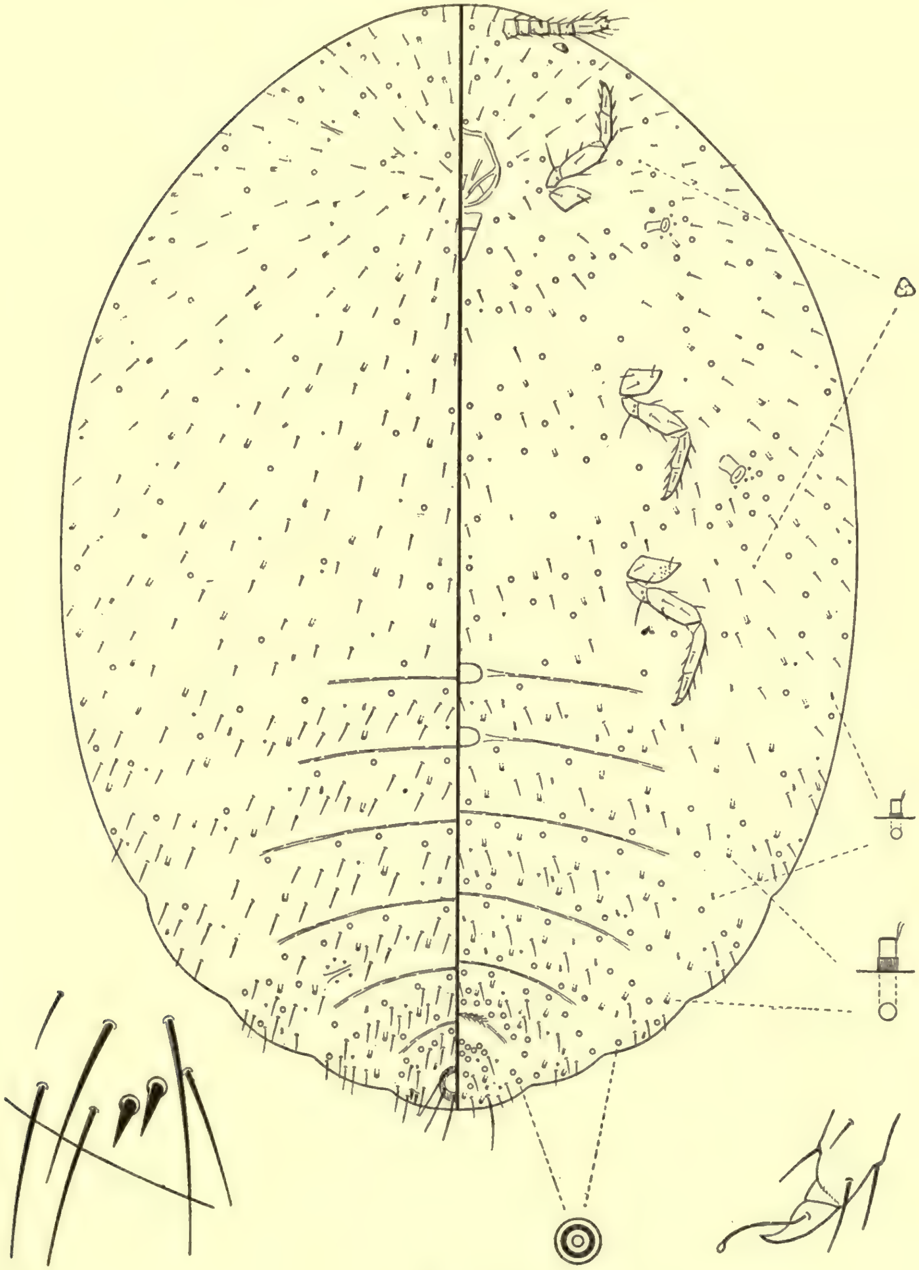

FIG. 18
Ripersia littoralis James.

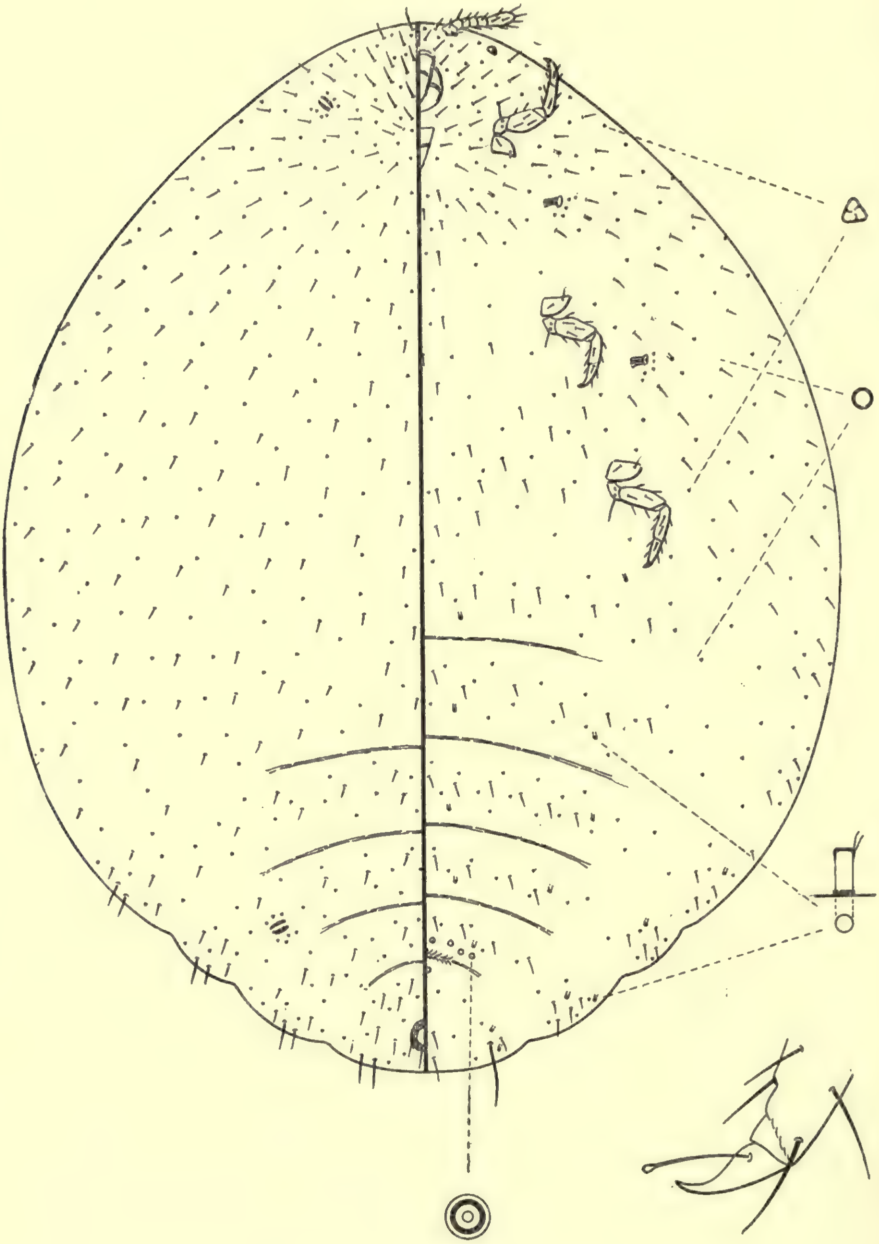

FIG. 19
Ripersia rotundata James.

Mounted specimens broadly oval, tapering at both ends. Marginal cerarii recognizable only on last four abdominal segments and each represented by a couple of moderately long setae set widely apart, without any grouping of trilocular pores. Each anal lobe with a long robust apical seta on ventral side. Multilocular disc pores very few, being limited to a small group of eight-to nine distributed ventrally along distal margin of abdominal segment VIII ; in one specimen one pore occurs on middle of segment IX plus X, posterior to genital opening. Tubular ducts of oral collar type very few and widely scattered on ventral side of postsoma. Trilocular pores few and uniformly distributed. Circular disc pores smaller than trilocular pores, few on both sides of the body. Dorsal ostioles small, lips heavily chitinized. Circulus absent. Legs small ; tarsal digitules setolose ; ungual ones knobbed. Anal ring set near abdominal end, entire, with six setae. Dorsal and ventral body setae small and sparse. Antennae small, with six joints ; in one specimen one antenna was five-jointed with a pseudo-articulation on third joint.

Ripersia themedae James

(Text-fig. 20)

Ripersia themedae James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 214.

The type of this species, which was a young adult female in fairly good condition, was the only specimen available. It was labelled : " *Ripersia themedae*, type, No. 303A, roots of *Themeda triandra*, mile 60, Bukoba-Masaka Rd., 26.i.1933, H. C. J."

" Appearance in life unknown. Total length of adult female 1·80–2·20 mm.; breadth 1·25–1·70 mm." (James, *l.c.*).

Body of mounted type elliptical. Only anal lobe cerarii are recognizable ; one of them is formed of four setae similar in size to those of dorsum, but stouter ; the opposite has only two setae ; in neither case is there any concentration of trilocular pores. Ventrally each anal lobe has a long and robust apical seta. Multilocular disc pores numerous on venter ; on abdominal segments IV–VIII they are mostly arranged in transverse rows along distal margin ; on segments VII and VIII some pores occur also along basal margin ; a few are scattered on prosoma and on abdominal marginal area of dorsum. Tubular ducts with oral collar present on both sides of body, and rather abundant on ventral surface of abdomen. Other numerous minute tubular ducts whose real structure is obscure, being deeply chitinized, occur all over the body. Trilocular pores numerous and uniformly distributed. Circular disc pores large being only slightly smaller than multilocular disc pores and having a granulated surface ; with no special arrangement, but they are most abundant on the venter, especially on abdomen. Dorsal ostioles inconspicuous. Circulus transversely elongate, membranous. Legs well developed, normal ; both tarsal and ungual digitules knobbed at apex. Anal ring set close to abdominal extremity, entire, with six setae. Dorsal and ventral body setae more or less similar, rather sparse on dorsum. Antennae seven-jointed.

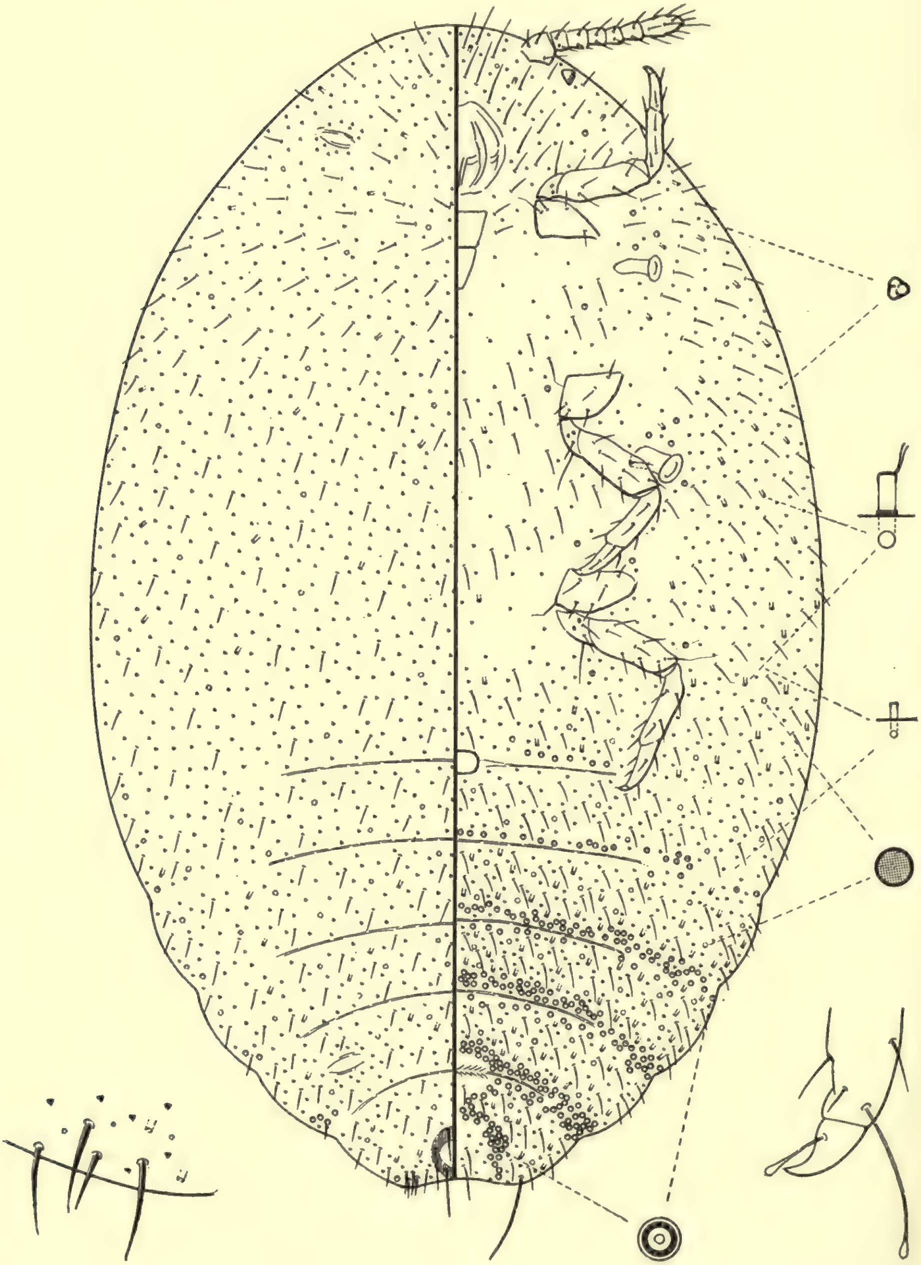

FIG. 20

Ripersia themedae James.

Trionymus insularis James (= ***Trionymus sanguineus*** James)

Trionymus insularis James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 202.

No type or paratypes of this species exist in the collections of the British Museum (Natural History), London, or elsewhere.

Going through James' description, which represents all we know about this species, the writer considers that *Tr. insularis* should be regarded at most as a form with eight-jointed antennae of *Tr. sanguineus* described also by James in the same paper. In *Tr. sanguineus* the antennal joints are not only very variable in size and shape, but even their number may range from six to eight. All other stuctures of *insularis* appear to be the same, or do not contradict those reported in the description of *sanguineus*, so justifying the sinking of *insularis* as a synonym of *sanguineus* which has page precedence. This step at the same time settles another point connected with this mealybug, namely the homonymy with *Tr. insularis* described by Ehrhorn in 1916.

Trionymus panici James (= ***Trionymus sanguineus*** James)

Trionymus panici James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 201.

Four slides containing the type and three paratypes of this species were examined; all were labelled with the following data : " *Trionymus panici* sp. n., No 413, roots of *Panicum maximum*, Mtwapa Rd., Mombasa, 22.viii.1933, H. C. J."

According to James' original description, *Tr. panici* can be separated from *Tr. sanguineus* " by the longer and more slender rostrum, and the different shape of the antennae ". No appreciable differences were found on the rostrum when compared with that of *sanguineus*. This structure normally does not offer any character of particular specific value. As regards the antennae, the joints tend to be shorter and stouter in some specimens than in *sanguineus*, but not in all specimens. As James himself stated, not only is the length of the joints variable, but also their number varies from six to seven on the same specimen, and this is the case in *sanguineus* also. An extensive examination of all remaining body structures led to the conclusion that the two species are identical and *panici* is here definitely sunk as a synonym of *sanguineus* which has page precedence.

Trionymus praegrandis James (= ***Saccharicoccus sacchari*** (Ckll.))

Trionymus praegrandis James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 200.

Two slides containing one specimen each were seen. They were labelled as follows : " Collection No. 56, *Trionymus praegrandis* sp. n., co-type, leaves; stems, bases of grass akalunga, Kampala, 6.vi.1929, H. C. J."

Both specimens were found to be identical with *Saccharicoccus sacchari* (Ckll.). James' statement that there is no circulus is erroneous. After restaining the specimens this structure was clearly visible and showed the shape so characteristic in this species. Therefore *Tr. praegrandis* is sunk as a synonym of *Saccharicoccus sacchari* (Ckll.).

Trionymus sanguineus James

(Text-fig. 21)

Trionymus sanguineus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 197.
Trionymus insularis James, 1936, *Ibid.*, **85** : 202.
Trionymus panici James, 1936, *Ibid.*, **85** : 201.

The material available for study was represented by two slides, each containing a single adult female in good condition. One slide was labelled : " *Trionymus sanguineus* sp. n., Outspan Hotel, Nyeri, Kenya, 21.i.1933, H. C. J." The second slide was provided with the following data : " *Trionymus sanguineus* sp. n., co-type, No. 4A (No. 17A), roots of *Bidens pilosa* L., Outspan Hotel, Nyeri, 21.i.1933, H. C. J."

" Adult female broadly oval in outline ; broadest across the mesothorax ; thinly coated with white wax ; short anal tassels present ; ovisac white, cottony in texture, voluminous, and appears to be secreted from all parts of the derm ; ground colour dark red. Length of adult female 1·90 mm.; breadth of adult female 1·50 mm. (under compression)." (James, *l.c.*).

The following redescription is made from slides of a long series of specimens recently collected in Kenya on roots of various hosts, which were carefully compared with James' paratype. The specimen illustrated is from roots of *Solanum tuberosum* L., Nairobi.

Mounted specimens elongate to broadly oval. Margin of body normally provided with only two pairs of cerarii. Anal lobe cerarii each with two conical spines, several trilocular pores and four to seven auxiliary setae ; area about the spines clear. Spines of pre-anal cerarii much more slender and longer, with groupings of trilocular pores ; auxiliary setae lacking. At times a third pair of cerarii is recognizable on margin of the antepenultimate abdominal segment. From antepenultimate abdominal segment as far as the thorax the cerarian spines may be replaced by a couple of setae which in some specimens are particularly long and robust. Ventral side of each anal lobe with a long stout apical seta ; subapical one much shorter. Multilocular disc pores present on both sides of body, more abundant ventrally ; on venter and dorsum of abdomen and thorax mostly arranged in segmental transverse rows along distal margin. Tubular ducts with oral rim rather variable in number and distributed on ventral and dorsal surfaces. Tubular ducts of oral collar type of two different sizes. The largest ones are the most abundant and on dorsum of thorax and abdomen are mostly arranged in transverse segmental groups near the distal margin in association with multilocular disc pores ; on the corresponding ventral side they tend to be crowded in small clusters ; other ducts are scattered on the head. Tubular ducts of smaller size few and distributed on dorsum and venter without any particular arrangement. Trilocular pores not numerous. Circular disc pores smaller than trilocular pores, few. Dorsal ostioles inconspicuous ; posterior ones with a cluster of a few trilocular glands and a few small setae. Circulus absent.

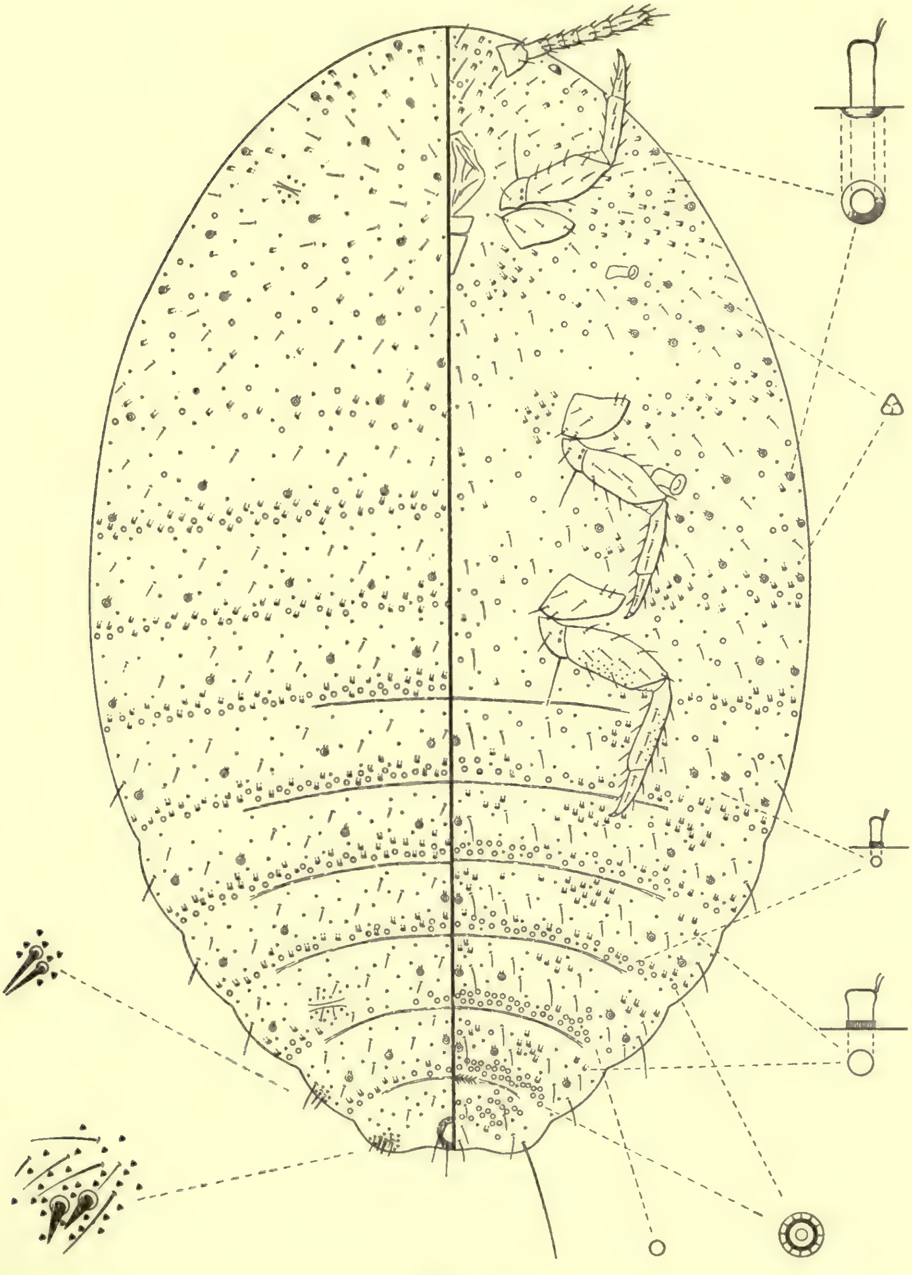

FIG. 21
Trionymus sanguineus James.

Legs rather short and stout; hind femur and tibia with some translucent pores. Dorsal and ventral body setae rather few, slender. Antennal joints very variable in size and shape, sometimes very short and stout; their number varies from six to eight, often marked by one or two pseudo-articulations.

Trionymus insularis and *panici* described by James in the same paper are synonyms of this species.

Trionymus sativus James

(Text-fig. 22)

Trionymus sativus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 198.

One single specimen labelled : " Collection No. 18A, *Trionymus sativus* sp. n., roots of *Leonotis nepetaefolia* R. Br., Ruiru, Kenya, co-type, 19.ix.1931, H. C. J." was seen.

" Adult female elongate oval in outline; sparsely powdered with white wax; short anal tassels only; ovisac cottony tinged with yellow and voluminous; oviparous; ground-colour pale yellow. Length varies from 1·50–2·45 mm.; breadth from 1·12–1·56 mm." (James, *l.c.*).

The following redescription is made from a series of fresh specimens recently collected in Nairobi, which were compared with the above paratype. The specimen used for the accompanying figure was collected on roots of *Coleus comosus* Hochst.

Mounted specimens elongate to broadly oval. Margin of body with one or two pairs of cerarii. Anal lobe cerarii each with two slender conical spines surrounded by a few trilocular pores and three to five slender auxiliary setae; sclerotized area moderately large, roundish. Each pre-anal cerarius at times represented by two spines longer and more slender than those of anal lobe cerarii, without any grouping of trilocular pores or auxiliary setae; occasionally only one spine is recognizable; oftener the spines are setolose and similar to dorsal setae. Anal lobes ventrally each provided with a small rather irregular sclerotized bar; apical seta long and robust; subapical one very much smaller. Multilocular disc pores present on ventral side of last six abdominal segments : (IV) 5–13; (V) 32–45; (VI) 50–71; (VII) 65–98; (VIII) 53–76; (IX plus X) 28–42. On segments anterior to genital opening they are mostly arranged along the distal margin, except on (VII) and (VIII) segments where a few also occur near basal margin. Tubular ducts with oral rim rather few; most of them very widely distributed on dorsum; those on venter are scattered along marginal and submarginal areas. Tubular ducts with oral collar in four groups on ventral marginal area of last abdominal segments anterior to anal lobes; others are distributed in irregular transverse rows in association with the multilocular disc pores. Trilocular pores not numerous. Circular disc pores very few, noticeably smaller than trilocular pores. Anterior and posterior dorsal ostioles inconspicuous. Circulus absent. Legs well developed; hind coxa and tibia with few translucent pores. Body setae scarce; dorsal ones small; ventral ones somewhat longer; both slender. Antennae with seven joints.

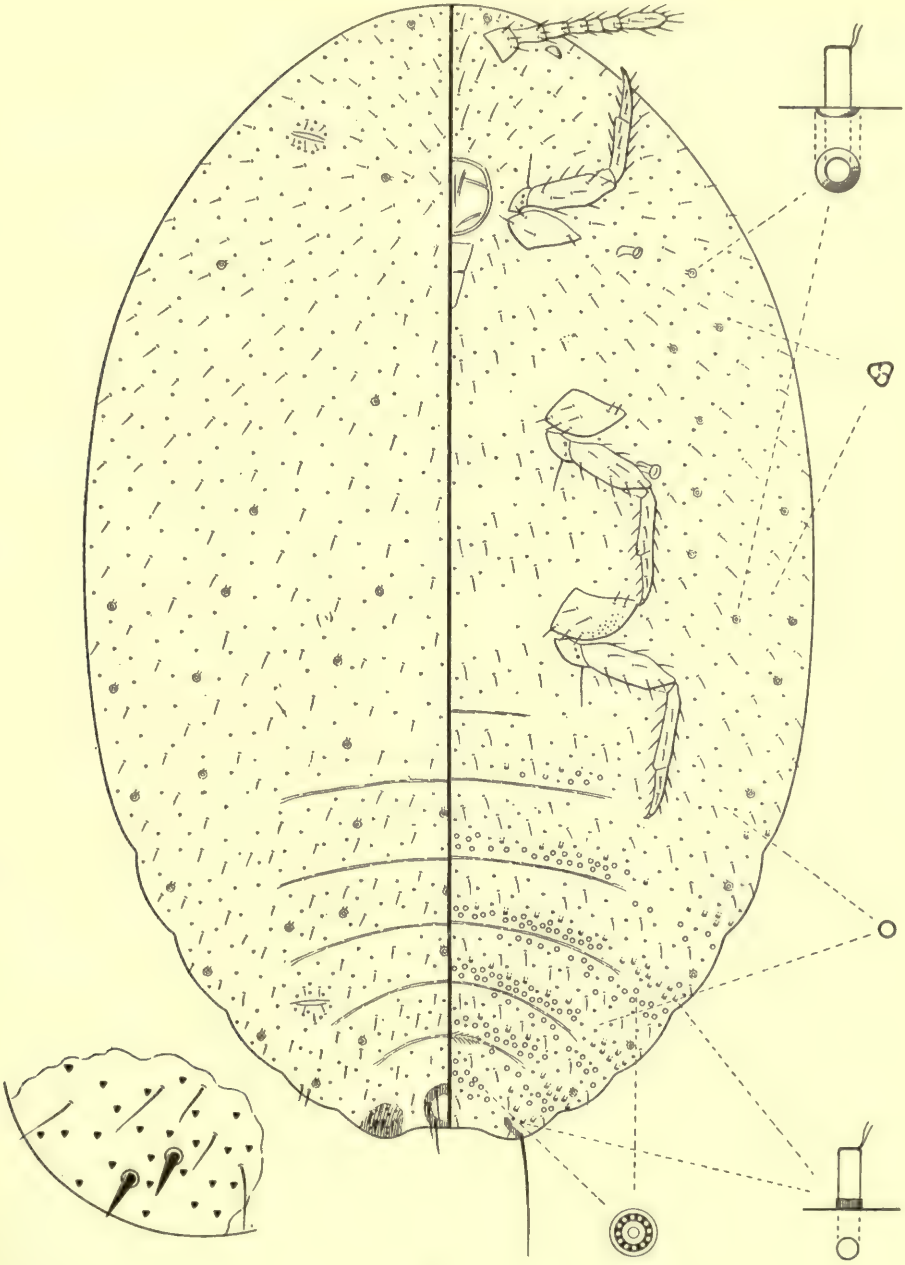

FIG. 22
Trionymus sativus James.

Trionymus sericeus James

(Text-fig. 23)

Trionymus sericeus James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 203.

One slide containing four partly distorted specimens in bad condition and another slide with a single adult female were seen. All were labelled with the following data : " *Trionymus coffeae* sp. n., coll. No. 369, leaves and stems of *C. arabica*, Kitale, Kenya, 27.vii.1933, H. C. J."

Although labelled as *Tr. coffeae* there is no doubt that the specimens actually belong to *sericeus* inasmuch as the collecting data are exactly the same as those published in the original description of *sericeus*. It seems likely that James at first thought he could name the species *coffeae*, but later, perhaps suspecting that this name might already have been used by previous authors, changed it to *sericeus*, failing to make the due correction on the slide labels.

Apart from some individual variations of minor importance, James' specimens of *sericeus* are the same as the mealybug described some years earlier by Newstead (1920 : 179) also from coffee in Nairobi (Kabete), Kenya, as a variety of *Pseudococcus perniciosus* Newst. & Willc. of which six paratypes were available for study. Notwithstanding this finding, the species has still to be understood as *Tr. sericeus* as Newstead in his original paper omitted to name the variety, and *sericeus* appears to be the first name available for it.

" Adult female elongate oval ; ovisac voluminous, silky buff-tinted, and envelops female ; body content purplish-black." (James, *l.c.*).

The following description and figure are based on a long series of specimens recently collected on coffee in various localities of Kenya.

In mounted specimens the body is elongate to very broadly oval in old adults ; length 1·9–4·1 mm.; breadth 1·30–2·9 mm. Cerarii recognizable only on seven or eight ultimate abdominal segments, each with two—seldom three— spines. Anal lobe cerarii each normally with two well developed conical spines and one or two slender auxiliary setae with a few trilocular pores and surrounded by an ill-defined, slightly sclerotized area. Remaining cerarii with spines somewhat smaller than those of anal lobe cerarii but slightly lanceolate and tending to be rather widely separated and never associated with auxiliary setae or with groupings of trilocular pores. Each anal lobe with a long robust apical seta and a few subapical ones on ventral side ; sclerotized bar absent. Multilocular disc pores very numerous on ventral median area of abdomen and metathorax, and on submarginal area as far as the anterior stigmatic opening. No multilocular disc pores occur on dorsum. Circular disc pores visible only on well stained specimens ; very few and widely distributed on both sides of body and somewhat smaller than trilocular pores. Dorsal tubular ducts of oral collar type evenly distributed ; ventral ones on abdominal median area smaller in diameter, but slightly longer ; both types are very abundant on ventral marginal area of abdomen and thorax. Trilocular pores rather few. A few dorsal setae similar in shape and size to those of pre-anal cerarii ; others much smaller. Ventral setae long and slender. Anterior dorsal ostioles apparently absent ; posterior

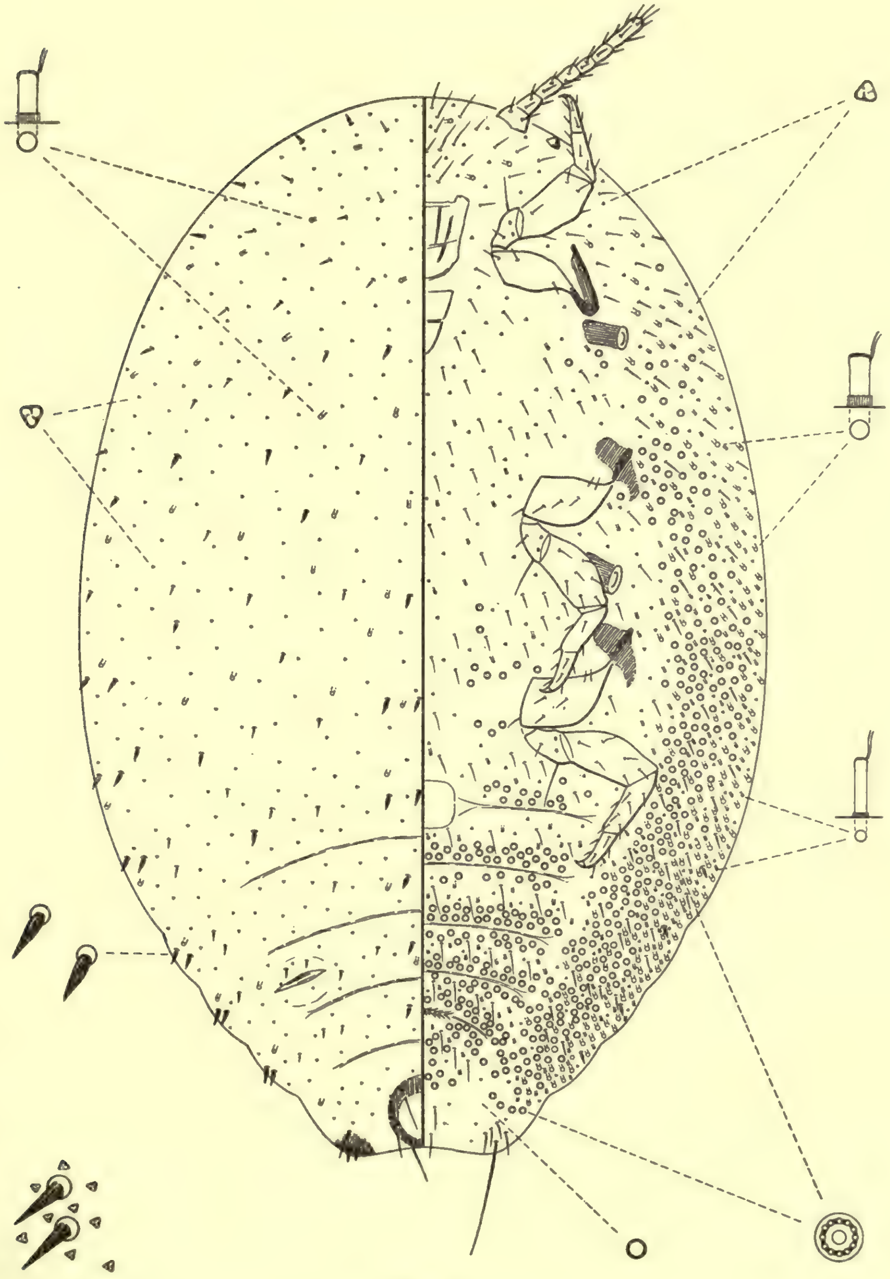

FIG. 23
Trionymus sericeus James.

ones very poorly developed. Circulus large, membranous. Legs short and robust, with a few translucent pores on hind coxa and tibia. Antennae with seven joints.

Trionymus sporoboli James

(Text-fig. 24)

Trionymus sporoboli James, 1936, *Trans. R. ent. Soc. Lond.* **85** : 199.

Only one specimen labelled : " *Trionymus sporoboli* sp. n., co-type, roots of kigutu,[1] Musera Estate, Ruiru, 16.viii.1932, slide 1, H. C. J." was available. This paratype is partly broken and distorted and in very poor condition.

" Adult female elongate oval ; sparsely covered with white wax ; no tassels ; ovisac large ; ground-colour reddish-brown." (James, *l.c.*).

Body of mounted specimen elongate elliptical. Marginal cerarii absent, except on anal lobes. In both anal lobe cerarii the spines were broken away but according to James they are slender and rather elongate. The spines are associated with a group of few trilocular pores and two or three auxiliary setae. Area about the spines clear. Ventrally one anal lobe is provided with a long robust seta ; on opposite lobe the seta is deeply trifurcate. Sclerotized bars absent. Multilocular disc pores rather numerous and widely distributed on both sides of body ; on ventral abdominal area arranged in segmental transverse rows. Tubular ducts of oral rim type also numerous on venter and dorsum, apparently without any regular arrangement, except on postsoma where they occur in segmental transverse groups. Ventral tubular ducts with oral collar few and arranged in small groups on submarginal area of last three abdominal segments anterior to anal lobe ; a few are scattered. Trilocular pores evenly distributed, not numerous. Circular disc pores very few on both surfaces of body, they are about as large as the trilocular pores. Dorsal and ventral setae moderately long and robust. Dorsal ostioles inconspicuous. Circulus absent. Legs well developed ; hind coxa with some translucent pores. Antennae with seven joints.

SUMMARY

The author discusses the identity of the Pseudococcidae described from East Africa by H. C. James. Twenty-four are retained as valid species and are redescribed. Six species are synonymized in the course of the paper.

ACKNOWLEDGMENTS

The writer wishes to thank Dr. W. J. Hall, Director, Commonwealth Institute of Entomology, London, and Dr. R. H. Le Pelley, Senior Entomologist, Scott Agricultural Laboratories, Nairobi, for the help given in connection with the present work and for reading and suggesting amendments to the draft. Thanks are also due to Mr. N. D. Riley, Keeper of Entomology and Dr. W. E. China, Deputy Keeper, for allowing the writer to work in the Department of Entomology of the British

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[1] Kikuyu name for an indigenous gramineous plant, apparently *Pennisetum catabasis*.

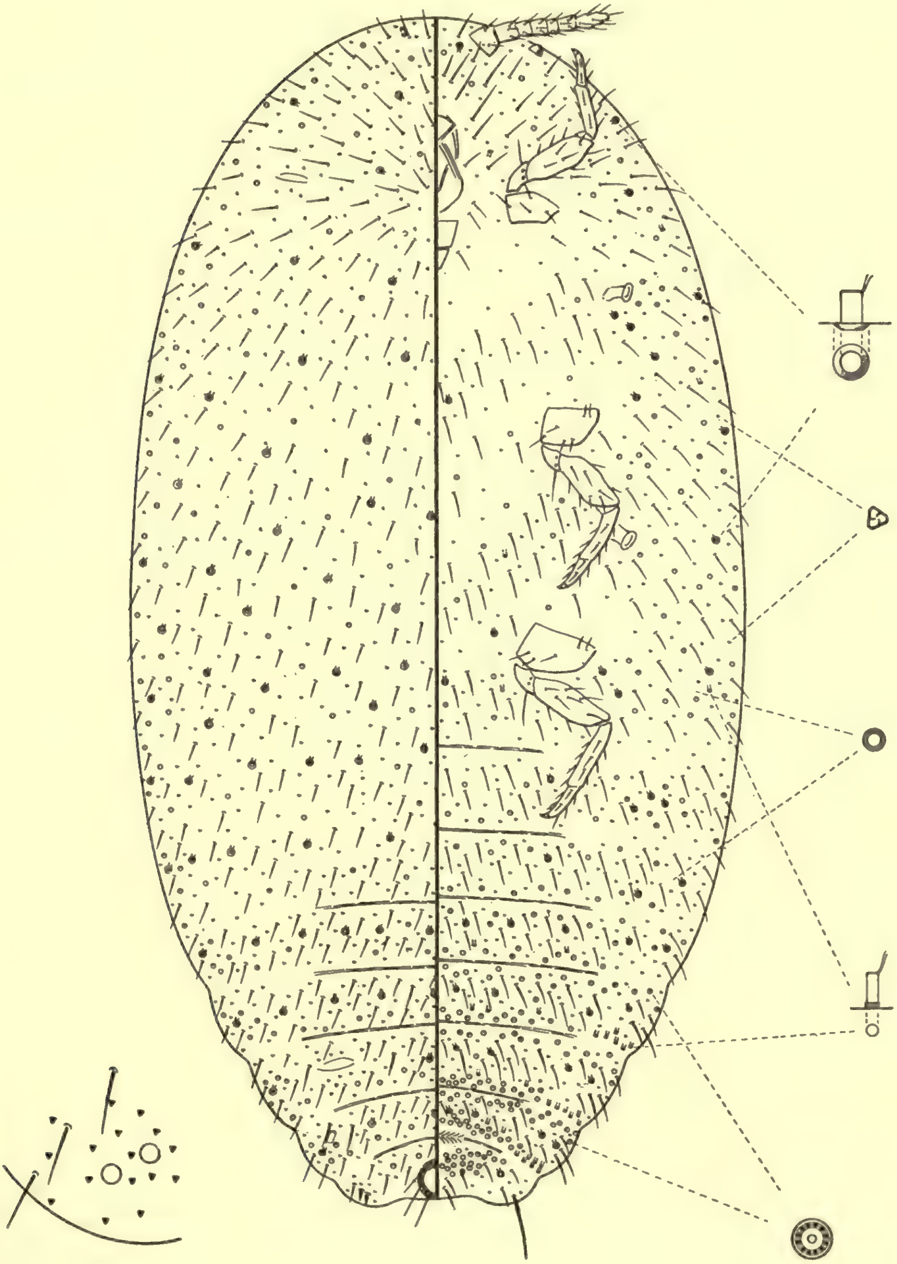

FIG. 24
Trionymus sporoboli James.

Museum (Natural History), London, and Mr. J. P. Doncaster, Entomologist in charge of the Homoptera collection who made available the original material required for the present paper. The author's thanks are especially extended to Dr. D. J. Williams, Commonwealth Institute of Entomology, London, for his invaluable co-operation which greatly facilitated this study and especially the work carried out in the British Museum (Natural History).

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NATURAL HISTORY

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T. G. HOWARTH

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ENTOMOLOGY Vol. 5 No. 6
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Pp. 233–272 ; *Figures* 1–105.

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A REVISION OF THE GENUS *NEOZEPHYRUS* SIBATANI AND ITO (LEPIDOPTERA : LYCAENIDAE)

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INTRODUCTION

THE genus *Neozephyrus* was originally separated from *Thecla* (*Zephyrus*) by Sibatani and Ito (1942, *Tenthredo: Acta entomologica* **3** [4]) with *taxila* Bremer selected as the type species of the genus. The two authors dealt only with the species occurring in Japan, Korea and Formosa and they included the following in their new genus ; *hecale* Leech, *taxila* Bremer, *coruscans* Leech, *hisamatsusanus* Nagami and Ishiga, *taiwanus* Wileman, *scintillans* Leech, *smaragdinus* Bremer, *nishikaze* Araki and Sibatani, *aurorinus* Oberthür, *sanctissimus* Araki and Sibatani, *teisoi* Sonan, *niitakanus* Kano and *ataxus* Doubleday & Hewitson. It is the aim of the present paper to bring together with these the other known species of this genus that occur elsewhere.

The present revision was brought about when the Höne collection of Lycaenidae from China had to be identified and it was found that the specimens under the name *scintillans* in the British Museum (Nat. Hist.) when examined genitalically consisted of no less than five distinct species, two of which had been described meanwhile by Dr. S. Murayama of Osaka from " duplicate " material which he had received in exchange. In order to place these species in their correct position the male genitalia of most of the known species of " *Zephyrus* " have been examined in order to obtain an overall picture. In so doing it has become apparent that, though specifically distinct, most of the species illustrate their relationship with each other and fall into well-defined groups or sections which future revisers may be inclined to elevate to subgeneric or even generic rank.

The true *Neozephyrus* extend into India and Pakistan as far west as the Afghanistan border and along the foothills on the southern side of the main Himalayan range and as far south as Loimwei in E. Burma. The three species, *absolon* Hewitson, *borneanus* Pendlebury and *malayicus* Pendlebury, which occur in Java, Sumatra, Borneo and Malaya respectively are so different genitalically that in the author's opinion it will be necessary to erect a new genus for them : *Austrozephyrus* gen. nov.

Neozephyrus is well represented in the British Museum (Nat. Hist.) mainly due to the collections made by Leech, Oberthür and Tytler, but since many of these were made in relatively restricted areas it is still very difficult to form a general picture in a vast country such as China, where material has been examined from relatively few isolated localities, so it is quite possible that at some later date when more material becomes available it may be necessary for certain modifications to be made.

Fortunately, where the museum has a large series of specimens of one species, it has been found that there is a general constancy both of external and genitalic characters ; consequently it is reasonable to assume that a single specimen, which exhibits divergences in both types of character, is a representative of a different entity.

All the males of *Neozephyrus* are a brilliant metallic-green which changes to either yellowish-, reddish- or bronze-gold or violet when wet with spirit, in some cases related species having the same colour. The colours in the descriptions are, wherever possible, in agreement with those in Ridgway (*Color Standards & Color Nomenclature*, Washington D.C., 1912) and consideration should be given to the fact that all insects are viewed in normal daylight with the viewer's back to the light source and with the insect held in a vertical plane directly in front of the viewer.

The drawings of the male genitalia were made with the aid of a camera lucida and are all of the same magnification for comparative purposes. The two views shown are the lateral aspect of the whole genitalia and *the ventral view of the left valva while still* in situ, not the more usual internal view of the right valva removed, as it has been found possible to examine and identify with certainty many of the males without dissecting them fully. This is done by brushing the tip of the abdomen to remove extraneous scales and then after wetting with wood naphtha exposing the clasp with a dissecting needle.

There are five forms of the female in this genus and for the sake of brevity Murayama & Sibatani (1943, *Trans. Kansai ent. Soc.* **13** (1), 55) used the letters A, B, AB and O to represent four of these and for the same reason the present reviser has also used these and adding AW to denote the fifth, as follows :

A. Female form with metallic-blue or purple patch in cell and space 1 of fore wing.
B. Female form with orange-red or yellowish patch at end of cell and space 3 of fore wing.
AB. Female form with combination of both A and B forms.
AW. Female form with white replacing orange of the AB form.
O. Female form with unicolorous brown fore wing.

To save space the following common abbreviations are used in the descriptive matter that follows:

F, Fore wing ; H, Hind wing ; gr. c. Ground colour ; sp, Space or interspace ; Un, Underside ; Up, Upperside ; v, Vein.

The measurements given in the descriptions are standardized, the length of the fore wing being measured from base to apex and the width of the border being measured at a point midway between veins 2 and 3.

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A Key to the genera and species groups within the genus " *Neozephyrus* " based on the external characters of the fore wing.

Group 1

1a (7) ♂ UpF unlike ♀.
1b (6) ♂ UpF brilliant metallic-green with black borders of variable width.
1c (5) ♂ UpF with black apex not running inward from costa to cell.
1d (4) ♂ Un like ♀ (except gr. c. in certain cases).
1e (3) ♂ Up gr. c. not tinged with violet.
1f (3*b*) ♂ UnF brown or grey-brown gr. c.
1g (3*a*) ♀ UpF with no white patch at end of cell and sp. 3.
1h (2) Un with discocellular bars distinct . . . *Neozephyrus scintillans* group

Group 2

2 (1*h*) Un with no discocellular bar, or if present very indistinct *Neozephyrus taxila* group

Group 3

3*a* (1*g*) ♀ UpF with white patch at end of cell and sp. 3.
3*b* (1*f*) ♂ UnF silvery-blue-grey gr. c. (with but one exception).
3 (1*e*) ♂ Up gr. c. shot with violet with but few exceptions
Neozephyrus birupa group

Group 4

4 (1*d*) ♂ Un unlike ♀ . . . . *Neozephyrus ataxus* group

Group 5

5 (1*c*) ♂ UpF with black apex running inward from costa towards cell *Austrozephyrus absolon* group

Group 6

6 (1*b*) ♂ UpF deep purple, sapphire-blue or very dark green with broad black borders *Teratozephyrus mandara* group

Group 7

7 (1*a*) ♂ UpF like ♀ . . . . *Teratozephyrus arisanus* group

N.B. The genus *Teratozephyrus* Sibatani (1946, *Bull. Lep. soc. Japan* **1** (3) : 77) (type *arisanus* Wileman) is included in the above key as Sibatani places *hecale* Leech in *Neozephyrus*, not having seen a specimen. The genus includes a number of Indo-Chinese species (not dealt with in this paper) formerly placed in *Thecla* (*Zephyrus*) namely *ziha* Hewitson, *arisanus* Wileman, ssp. *ouvrardi* Riley, ssp. *picquenardi* Oberthür, *hecale* Leech, *melli* Forster, *pavo* de Nicéville, *coelestis* Leech, *courvoisieri* Oberthür, *tayal* Esaki & Shirôzu*, *mandara* Doherty, ssp. *bieti* Oberthür, ssp. *dohertyi* de Nicéville, ssp. *irma* Evans, *icana* Moore, *neis* Oberthür, *vallonia* Oberthür, *forsteri* Esaki & Shirozu*, and *tsangkie* Oberthür (= *doni* Tytler syn. nov.).

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* Not examined.

The various numbered groups in the above key can be arranged in the following order according to the formation of the male genitalia :

Uncus—	
Simple	1, 3, 4
Developing	2
Complex	5, 6, 7
Falces—	
Simple	6, 7
Complex	1, 3, 4
Robust	2
Missing	5
Aedeagus—	
Spurred	2
Unspurred	1, 3, 4, 7
Bent or twisted	5, 6

As will be seen by the above table the *taxila* group, i.e. the true *Neozephyrus*, is quite distinct genitalically and at the time of writing the author understands from Dr. T. Shirôzu of Kyushu University that the groups within *Neozephyrus* will probably be raised to generic rank when his studies are completed.*

A KEY TO THE SPECIES

Group 1

Falces long and hooked with well-spurred " elbow " (see Fig. 1).

a(*bcd*) : Valva with lower apical lobe enlarged as in *aurorinus* Oberthür (see Text-fig. 1).

1	(2*a*)	UnH with orange ocellus and tornal spot confluent and almost filling sp. 1*c* at margin	*aurorinus* Oberthür
2*a*	(1)	UnH not as 1	
2	(3*a*)	♂ F very pointed at apex (see Pl. 8, fig. 48). ♂ UpF very broad border as H (2·5 mm.)	*sikkimensis* sp. n.
3*a*	(2)	♂ F not very pointed at apex.	
3*b*	(5*a*, 7)	♂ UpF border as H, narrow (·5–·75 mm.).	
3	(4)	♂ UpF border widening sharply at apex	*nigroapicalis* sp. n.
4	(3)	♂ UpF border not widening sharply at apex.	
		α From Indian region	*kabrua* Tytler
		β From Formosa	ssp. *niitakanus* Kano
5*a*	(3*b*, 7)	♂ UpF border as H, broad (1–2 mm.).	
5	(6)	♂ UpF border 1 mm.	*scintillans* Leach
6	(5)	♂ UpF border 2 mm.	*watsoni* Evans
7	(3*b*, 5*a*)	♂ UpF border not as H but narrower (F 1 mm., H 1·5 mm.)	*letha* Watson
8	(9, 10)	♂ UpF border narrow (·5 mm.)	*teisoi* Sonan
9	(8, 10, 11)	♂ UpF border broad (1·5 mm.)	*vittatus* Tytler
10	(8, 9, 11)	♂ UpF border very broad (2·5 mm.)	*marginatus* sp. n.
11	(8, 9, 10)	♂ UpF border extremely broad (3 mm.)	*zoa* de Nicéville

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* Since going to print the important paper by Shirôzu and Yamamoto (1956, *Sieboldia* **1,** (4)) has been published in which the authors have described the new genus *Chrysozephyrus* as distinct from *Neozephyrus* which contains many of the species dealt with in this paper in 'Groups' 1, 3 and 4. They also described one new species, *tienmushanus,* which has been included in the present paper under its correct name to prevent publishing a synonym.

b(*acd*) : Valva with lower apical lobe reduced and shaft developing as in *sandersi* sp. n. (see Fig. 13).

1 (2*a*) ♂ UpF with black border extremely broad (3–4 mm.) . . . *tytleri* sp. n.
2*a* (1) ♂ UpF with black border narrower (under 3 mm.)
2 (3*a*) ♂ UpH with blue marginal line at base of tail . . . *sandersi* sp. n.
3*a* (2) ♂ UpH without blue marginal line at base of tail.
3 (4) ♂ UpF length 20 mm., border 1 mm. . . . *intermedius* Tytler
4 (3) ♂ UpF length 21 mm., border 1·5 mm.
  α ♂ UnH with gr. c. not darker inwardly of postdiscal " W ".
    From Chinese region . . . . . . *desgodinsi* Oberthür
  β ♂ UnH with gr. c. darker inwardly of postdiscal " W ".
    From Indian region . . . . . . ssp. *dumoides* Tytler

c(*abd*) : Valva with no lower apical lobe and shaft extended to form large hook as in *duma* Hewitson (see Fig. 17).

1*a* (5) ♂ UnH with no orange in margin of sp. 1*c*.
1 (2*a*) ♂ UnF with postdiscal line broadly marked with darker inwardly *duma* Hewitson
2*a* (1) ♂ UnF with postdiscal line narrowly marked with darker inwardly.
2 (3*a*) ♂ UpF with black border of medium width (1·5 mm.) *tatsienluensis* Murayama
3*a* (2) ♂ UpF with black border narrow (1 mm. or under).
3 (4) ♂ Un gr. c. unicolorous brown . . . . *nishikaze* Araki & Sibatani
4 (3) ♂ Un gr. c. greyish-brown, paler between postdiscal and submarginal lines . . . . *yunnanensis* sp. n.
5 (1*a*) ♂ UnH with orange markings extending to near margin of sp. 1*c*.
  α ♂ UpH with marginal line at base of tail absent *smaragdinus* Oberthür
  β ♂ UpH with marginal line at base of tail present ssp. *sikongensis* Murayama

d(*abc*) : Valva with enlarged lateral " shelf " (see Fig. 22).

1*a* (4*a*) Un with discocellular bars distinct.
1*b* (3) ♂ UpF black border narrow (·75 mm.).
1 (2) ♂ Up gr. c. blue-green . . . *tienmushanus* Shirôzu & Yamamoto
2 (1) ♂ Up gr. c. bronze-green . . . . *chinensis* sp. n.
3 (1*b*) ♂ UpF black border very broad (2·5 mm.) . . . *souleana* Riley
  ♂ UpF black border narrower (2 mm.) . . . *angustimargo* ssp. n.
4*a* (1*a*) Un with discocellular bars indistinct.
4 (5) ♂ Up reflects yellowish bronze when wet.
  From China . . . . *disparatus* sp. n.
  ♂ UpF border very narrow (·5 mm.).
    From Formosa . . . . . . *pseudotaiwanus* ssp. n.
    From Assam . . . . *pseudoletha* ssp. n.
  ♂ UpF border broader (1 mm.).
    From Sikkim . . . . . . *interpositus* ssp. n.
5 (4) ♂ Up reflects violet when wet . . . . . *rarasanus* Matsumura

Group 2

Falces very robust and not heavily spurred at " elbow " or hooked at tip (see Fig. 27).

1 (2*a*) ♂ Up reflects yellow when wet.
  α ♂ UpF border very narrow (·25 mm.). From Formosa *mushaellus* Matsumura
  β ♂ UpF border broader (1 mm.). From China. ssp. *rileyi* Forster

2*a* (1) ♂ Up reflects violet when wet.
2 (3*a*) ♂ UnH postdiscal line in form of " V " *hisamatsusanus* Nagami & Ishiga
3*a* (2) ♂ UnH postdiscal line in form of " W ".
3 (4*a*) ♂ UpH with blue at base of sp. 8 *suroia* Tytler
4*a* (3) ♂ UpH without blue at base of sp. 8
4 (5*a*) ♂ UnF with postdiscal line not straight *dubernardi* Riley
5*a* (4) ♂ UnF with postdiscal line straight.
5*b* (8) ♂ UpF very broad border (over 1·5 mm.) not of even width.
5*c* (7) ♂ UpF border not widening sharply at v. 3.
5 (6) ♂ UpH blue marginal line at base of tail absent *coruscans* Leech
6 (5) ♂ UpH blue marginal line at base of tail present *helenae* sp. n.
7 (5*c*) ♂ UpF border widening sharply at v. 3 *taiwanus* Wileman
8 (5*b*) ♂ UpF narrower black border (under 1·5 mm.) of even width.
α Small, Un grey, occurring north of Lat. 42 N. approximately. *taxila* Bremer
β Large, Un brown, occurring south of Lat. 42 N. approximately. ssp. *japonica* Murray

Group 3

1*a* (9) H tailed.
1*b* (7*a*) UnH discal band straight and continuous from v. 2 to costa.
1 (2*a*) Un gr. c. grey-brown not silver (except some Nepalese specimens).
UnH orange and black spots at tornus and sp. 2 very prominent.
♂ UpF border broad (2 mm.) H border as F *birupa* Moore
2*a* (1) Un gr. c. bluish-silver.
2*b* (5a) UnH orange spots at tornus and sp. 2 absent.
2 (3*a*) ♂ UpH border (1·5 mm.) narrower than F (2 mm.) *bhutanensis* sp. n.
3*a* (2) ♂ UpH border as F(1–1·25 mm.).
3 (4) ♂ UpH border not irrorated with blue *triloka* Hannyngton
4 (3) ♂ UpH border irrorated with blue *jakamensis* Tytler
5*a* (2*b*) UnH orange spots at tornus and sp. 2 present.
5 (6) ♂ UpH border as F (1·5 mm.) not irrorated with blue *syla* Kollar
6 (5) ♂ UpH border (1·25 mm.) narrower than F (1·5 mm.) irrorated with blue in many specimens *assamicus* Tytler
7*a* (1*b*) Not as 1*b*.
7 (8) UnH discal band irregular and bowed out opposite cell *kirbariensis* Tytler
8 (7) UnH discal band irregular and bowed in opposite cell *paona* Tytler
9 (1*a*) H tailless *khasia* de Nicéville

Group 4

1 (2*a*) ♂ UpF with black border broad (1·25–2 mm.) widening conspicuously at apex *ataxus ataxus* Hewitson
2*a* (1) ♂ UpF with black border narrow (·5 mm.) not widening at apex.
2 (3*a*) ♂ UnH brown markings in sub-basal and submarginal areas conspicuous ssp. *zulla* Tytler
3*a* (2) ♂ UnH brown markings in sub-basal and submarginal areas obsolete or nearly so.
3 (4) H tails of normal length ssp. *kirishimaensis* Okajima
4 (3) H tails short ssp. *yakushimaensis* Yazaki

Group 5

1 (2) ♂ UpF with green gr. c. extending to approximately half the length of costa *absolon* Hewitson
2 (1) ♂ UpF with green gr. c. extending to approximately two-thirds the length of costa *borneanus* Pendlebury

GROUP 1

Neozephyrus aurorinus Oberthür

(Fig. 1)

Thecla aurorina Oberthür, 1880, *Étud. d'Ent.* **5** : 18.
Thecla brillantina Staudinger, 1887, *Romanoff Mém. sur Lép. réd.* **3** : 30, t. 6, fig. 3*a* ♂, 3*b* ♀.
Thecla aino Matsumura, 1915, *Ent. Mag. Kyoto* **1** : 57, t. 2, fig. 9.

This species was originally described from a female from Askold Is. by Oberthür as an aberration of *taxila*. Matsumura considered the Japanese race as a separate species and described it under the name *aino*. Seitz (*Macrolep. World* **1** : 270, pl. 73*g*) described under the name *jankowskii* two males from between Chang-Yang and Hankow (?) as a new form of *coruscans*. The B.M. (N.H.) possesses three males from Wychang (?) which are slightly larger (23 mm.) than the nominotypical race but otherwise seem to be indistinguishable from it. The genitalia of these are the same as those of *aurorinus* from Askold Is. and Japan.

The male Up reflects bronze when wet. The females belong to the AB and B forms.

DISTRIBUTION. China and Japan.

There is one subspecies from Japan separated by Murayama :

ssp. ***alpinus*** Murayama, 1954, *New Entomologist*, **3** (4) : 34–35.

(= ***kansaiensis*** Murayama (*ibid.*) teste. Inoue, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** : 11.)

This subspecies is larger than the nominotypical race from Hokkaido, the black border being broader on the male Up and the female having the orange markings of UpF much larger.

DISTRIBUTION. Chubu and Kanto Districts of Honshu.

Neozephyrus sikkimensis sp. n.

(Figs. 2, 48, 58)

MALE. Frons hairy, black with paler centrally, bordered on either side with white which encircles the eyes ; palpi bluish-white with dorsal and lateral stripes of black, with a mixture of long dark and pale hairs ventrally ; eyes vandyke-brown with cinnamon-buff hairs ; antennae black with narrow white intersegmental rings, tips cinnamon-buff ; thorax brown with very dark bluish-green hairs, paler beneath ; abdomen dark brown paler beneath ; legs dark brown with paler scales on femora and tibiae and with paler intersegmental rings on tarsi.

UpF. Shape triangulate with costa and outer margin only slightly curved ; gr. c. bluish-metallic-green ; blackish-brown border 2·5 mm. broad, of even width extending basad along veins at apex and costa ; inner margin not sharply defined ; fringe fuscous, paler towards tornus ; length 24 mm ; reflects bronze when wet.

UpH. Gr. c. as F ; border as F broadening sharply along costa between v. 6 and 7 and also along hind margin to base in sp. 1*b* ; fringe as F, darker outwardly towards tornus ; no blue marginal line at tornus ; tail blackish-brown with white tip, 5 mm.

UnF. Gr. c. drab ; discocellular bar slightly darker ; postdiscal line irregular, inwardly shaded with drab slightly darker than gr. c.; submarginal line darker at tornus and indistinct at apex, faintly lined on either side with paler drab ; fringe drab, paler at tornus.

UnH. Gr. c. drab ; discocellular bar indistinct ; sub-basal bar indistinct, lined inwardly with white ; postdiscal " W " white, irregular, stepped and curved outwards at v. 7 to costa ; inner submarginal crescents indistinct at apex ; submarginal irroration pale then bluish towards ocellus and tornus ; black pupilled ochraceous-orange ocellus in submargin of sp. 2 ; tornal spot blackish, inwardly lined with ochraceous-orange and again with sapphire-blue ; antemarginal line white, indistinct at apex ; margin as gr. c. with paler fringe.

HOLOTYPE MALE. Sikkim, O. Möller, ex coll. Elwes, 1915–207, B.M. Type No. Rh. 16027, in B.M. (N.H.).

PARATYPE MALE. India, ex. coll. Fruhstorfer, B.M. 1933–131, B.M. Type No. Rh. 16028, Gen. No. T. G.H. 1955–151, in B.M. (N.H.).

Superficially this species rather resembles *desgodinsi dumoides* on Up but can at once be separated from this by the Un lacking the deeper shading inwardly of the postdiscals.

FEMALE. Unknown.

DISTRIBUTION. Sikkim.

Neozephyrus nigroapicalis sp. n.

(Figs. 3, 49, 59)

MALE. Frons hairy, blackish-brown with paler median line, on either side lined with whitish which encircles the eyes ; palpi porrect, white, black dorsally and with a black lateral stripe, clothed in black hairs ventrally except for a distinct line of white on inner edge ; eyes brown with cinnamon-buff hairs ; antennae black with narrow white intersegmental rings and tipped with testaceous ; thorax dark brown with bluish-green hairs, paler beneath ; abdomen with bluish-grey hairs, paler beneath ; legs white with scattered brown scales ; tarsi brown with white intersegmental rings.

UpF. Gr. c. metallic-green with narrow black border (·75 mm.) broadening sharply at apex and continuing along costa to v. 12 ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border as F, very slightly broader (1 mm.) ; sapphire-blue line distinct in margin of sp. 1 and 2 ; tail black tipped with white (5 mm.) ; fringe white, darkened outwardly towards tornus.

UnF. Gr. c. drab ; discocellular bar indistinct ; postdiscal line straight between costa and v. 3 then slightly angled in sp. 2, indistinctly shaded inwardly and narrowly with slightly darker drab ; submarginal band broad, hair-brown in sp. 1 and 2 then shading off narrowly towards apex, outwardly edged with white, becoming indistinct towards apex ; antemarginal line white ; margin dark drab ; fringe white.

UnH. Gr. c. as F ; no sub-basal bar ; discocellular bar as F ; postdiscal " W " not straight but stepped slightly in each interspace, white, very slightly shaded inwardly with darker gr. c. ; inner submarginal line bluish-white interrupted by the veins, indistinct at apex ; submarginal line drab, outwardly irrorated with bluish-white ; prominent black pupilled apricot-orange ocellus in sp. 2 almost joined to the tornal spot by a small spot of apricot-orange and an indistinct black line inwardly of the tornal spot and ocellus ; sapphire-blue line basad and inwardly of tornal spot ; white antemarginal line continuous from v. 7 to tornus ; margin drab ; fringe white.

HOLOTYPE MALE. Siao-lou, Chasseurs indigènes du P. Déjean, 1902, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16029, Gen. No. T.G.H. 1955–158, in B.M. (N.H.).

This species is only known from the one specimen and may be distinguished by the black borders on the Up being very narrow, that on the UpF widening sharply at the apex.

FEMALE. Unknown.

DISTRIBUTION. Szechwan.

Neozephyrus kabrua Tytler ***comb. nov.***

(Figs. 4, 50, 60)

Zephyrus kabrua Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 128, pl. iv, fig. 41, ♂.

Tytler in his original description wrongly described a female of *duma* Hewitson as the allotype of this species and though he and his collectors must have taken a number of males the true female has remained unknown until the present time. It is described below from the unique specimen presented by D. F. Sanders to the B.M. (N.H.).

FEMALE. Frons hairy, black-brown edged on either side with a fine white line ; eyes hairy, black-brown ; palpi porrect, clothed with black scales on upper surface and white scales on lower, with a mid lateral stripe of black scales and a median line of short dark hairs ; antenna black with narrow intersegmental rings of white, with orange-red tip to club ; thorax and abdomen brown, paler beneath ; legs brownish-white with first and fifth tarsal segments brown.

UpF. AB form ; gr. c. dark brown with two apricot-buff patches, one at the end of cell, the other in sp. 3, the former triangular, the latter lozenge shaped ; metallic-sapphire-blue patch in cell and sp. 1*a*, 1, 2 and 3, that in sp. 1*a* extending to three-quarters the length of the inner margin, that in sp. 1 extending to the submargin, that in sp. 2 with lower point just reaching to half way along v. 2 ; fringes brown ; length 19 mm.

UpH. Gr. c. as UpF slightly darker towards margin and anal lobe, with an irroration of metallic-sapphire-blue scales in lower half of cell and a few at the base of the tail on either side of v. 2 ; a small dark brown patch in the submargin of sp. 2 ; tail dark brown tipped with white ; fringe brown, inwardly paler from v. 3 to tornus.

UnF. Gr. c. brownish-drab, paler towards inner margin; discocellular bar distinct, deep brownish-drab, indistinctly shaded outwardly with yellowish; postdiscal line slightly curved outward from costa to v. 2, very pale drab-grey, bordered inwardly and broadly with deep brownish-drab shading to gr. c., outwardly to the same width with pale purplish-drab; submarginal band deep brownish-drab slightly darker in sp. 1 and 2; submarginal line pale purplish-drab indistinct at apex but more distinct and broadening towards tornus; marginal band deep brownish-drab with margins slightly darker; fringe brownish-drab paler towards tornus.

UnH. Gr. c. brownish-drab darkening slightly towards costa; discocellular bar distinct, deep brownish-drab with a pale purple drab line inwardly; the postdiscal " W " very slightly curved inward between costa and v. 2, a pale purple-drab, inwardly margined with deep brownish-drab shading to gr. c.; the space between the broad deep brownish-drab submarginal line and the " W " pale purple-drab; the submarginal area irrorated with pale purple-drab; a distinct marginal line of this same colour; a prominent black pupilled apricot-yellow ocellus in sp. 2; at tornus inwardly along v. 1 there is a black lunule edged on the concave side with one of apricot-yellow of the same width which is itself inwardly edged with a narrow black lunular mark; the apricot-yellow lunule extends along the hind margin parallel with the lower part of the " W " with a few metallic-blue scales along the inner edge; fringe as UpH; over the whole surface and on the apex of UpF there is a distinct violet iridescence.

NEALLOTYPE FEMALE. NE. India, Assam, Manipur, 6,000 ft. vi.1937, Himalayan Butt. Co. Shillong, B.M. 1956–423, B.M. Type No. Rh. 16030, in B.M. (N.H.).

The male Up reflects bronze when wet. Holotype male in B.M. (N.H.).

DISTRIBUTION. Male specimens in B.M. (N.H.) from Sikkim (O. Möller), Phesima, Naga Hills, 7,500 ft. 21–27.vii.1913, Kabru, Manipur 8,000–8,400 ft. vi.vii.1913. Tytler.

ssp. ***niitakanus*** Kano ***comb. nov.***

(Fig. 5)

Zephyrus niitakanus Kano, 1928, *Taiwansangaku, Taihoku* **3** : 75.
Zephyrus kanonis Matsumura, 1929, *Insecta matsum.* **3** : 101, ♀.

Though the author has not seen the original description Sibatani & Ito in their paper in *Tenthredo* (1942, **3** : 330) on this genus place *kanonis* Matsumura as a synonym of *niitakanus* Kano. The latter is well described in English by Matsumura (1929) and figured in " *Zephyrus* " (1937, **7** : pl. 9 fig. 9 ♀, fig. 10 ♂).

In the male this subspecies is distinguished from the others of this genus by the combination of the following characters: the narrow black border (·5 mm.) hardly widening towards apex of the fore wing, the length of which is 20 mm., the drab-grey gr. c. of the Un which is lighter between the postdiscals and submarginals, and the proximity of the discoidal bar and the postdiscal " W ". When wet with spirit the metallic-yellow-green of the Up turns to a reddish-bronze. The genitalia place this as the Formosan representative of *kabrua*. The female belongs to the A form.

DISTRIBUTION. Formosa, three males from Sankakuho (2) and Horisha (1) in B.M. (N.H.).

Neozephyrus scintillans Leech

(Fig. 6)

Zephyrus scintillans Leech, 1893, *Butterflies of China, Japan and Corea* **2** : 376, pl. xxvii, figs. 10 ♀, 11♂.

Holotype male and allotype female from Chang Yang, C. China in B.M. (N.H.). Apart from the types the B.M. (N.H.) possesses another pair with the same data as the types and three males, one each from Tien Tsuen (Szechwan), Mt. Omi and Wychang (? Weichang, Chihli 42 N., 117 E.). A series from Lingping (Kwangtung), Likiang (N. Yunnan) and West Tien-mu-shan (Chekiang) in the Höne collection has been examined. It has been found necessary to examine the genitalia of the males in most cases since they seem to vary a little individually in genitalia and in external facies. Male specimens from the type locality appear to have the borders of both F and H of the same width (1 mm.) broadening to 2 mm. at the apex of F and having the postdiscals on the Un nearly straight, whereas some specimens from Kwangtung and Chekiang have very slightly broader borders on the Up, the postdiscal part of the " W " on UnH in sp. 2 is in line with the discocellular bar, it then curves round the cell parallel to the margin and is then bent outward again in sp. 7. A female from Chekiang agrees exactly with the allotype, which belongs to the B form. There are also two males in the Höne collection labelled "Asamayama, Japan, 9–10.viii.14, H. Höne," which appear to differ in no way from the Chinese mainland race. If these two specimens are correctly labelled, which would seem very doubtful, then apparently they are the first recorded from Japan.

The male Up reflects bronze when wet.

DISTRIBUTION. Yunnan, Szechwan, Kwangtung, Chekiang, Chihli (?) and Japan (?).

Neozephyrus watsoni Evans ***comb. nov.***

(Figs. 7, 51, 52, 61, 62)

Thecla letha watsoni Evans, W. H., 1927, *Identification of Indian Butterflies*. 1st edition, p. 160.

The identification of Indian Butterflies originally appeared in parts in the *Journal of the Bombay Natural History Society* from 1923–26. Later it was printed separately as a book, the first edition being published in 1927. In this edition there was (teste Evans himself) a printer's error for *Thecla letha* Watson, the name Watson being italicized with a small "W" and with a final "i" added. Evans had before him at the time of writing a pair of what he thought were *Thecla letha* from Loimwe, Burma, and gave the following brief description: " Below uniform brown, areas between discal and submarginal lines not conspicuously paler : ♀ above as *ataxus* ". On examination the genitalia have proved these to belong to a distinct species and it is thought advisable to give a fuller description.

MALE. Frons hairy, black with a few white hairs centrally, edged on either side with white which encircles the eyes ; palpi porrect, whitish with black tips, the black extending down either side, clothed with dark hairs ventrally ; antenna black, narrowly ringed intersegmentally with white, club tipped with brown ; thorax and abdomen above brownish-black covered with bronze-green hairs, below covered with whitish hairs ; legs whitish, tarsi black with whitish intersegmental rings.

UpF. Gr. c. metallic-blue-green with black-brown border broadening at apex and extending along costa to v. 11; border 2 mm. with rather ill-defined inner margin; fringes brownish-white paler towards tornus; length 21 mm.; reflects bronze when wet.

UpH. Gr. c. as F; border the same width with sapphire-blue line at base of tail in tornal part of sp. 2 and to tornus; tail black tipped with white; fringe whitish, edged with black towards tornus.

UnF. Markings very similar to *scintillans*; gr. c. slightly greyer brown.

UnH. Gr. c. as F; markings as *scintillans* but with postdiscal arm of " W " bent slightly outwards from v. 5 to costa; margins distinctly darker than gr. c. contrasting sharply with the white antemarginal line; ocellus and tornal spots orange.

FEMALE. Frons, palpi and antennae as male; thorax and abdomen brown above, paler beneath; legs as male.

UpF. AB form; gr. c. dark brown (Prout's); patch at end of cell and sp. 3 and part of sp. 2 apricot-buff; cell and base of sp. 1*a*, 1, 2 and 3 sapphire-blue; border 3·5 mm.; fringe brown, tipped with white; length 21·5 mm.

UpH. Gr. c. as F paler towards costa, discoidal cell with overlay of sapphire-blue scales; a scattering of this same colour over the remainder of wing especially in sp. 1 and 2 with an indistinct crescent-shaped submarginal line on either side of v. 2; marginal line slightly darker than gr. c.; dark centred apricot-buff patch corresponding to ocellus on Un in sp. 2 visible; fringe brownish, paler towards tornus; tail 5 mm., brown tipped with white; length 22 mm.

UnF. Gr. c. drab, slightly buffish at end of cell corresponding to patch on UpF; discocellular bar distinct, lined either side with slightly paler colour than gr. c.; postdiscal band white with slightly darker drab inwardly; fuscous submarginal spots at tornus distinct, edged outwardly with whitish which extends as the submarginal line towards apex; margin distinct, fuscous; fringe as UpF.

UnH. Gr. c. as F; discocellular bar as F; white " W " edged inwardly with fuscous, its outer arm almost straight except at apex where it is curved slightly inwards; submarginal crescents irrorated; black pupilled submarginal ocellus in sp. 2 apricot-buff with tornal spot of same colour extending basad along hind margin; margin distinct, fuscous inwardly edged with white; fringe white.

HOLOTYPE MALE. Loimwe (Burma) 5,600, 24.v.23, B.M. 1925–175, B.M. Type No. Rh. 16031, Gen. No. T.G.H. 1955–125 in B.M. (N.H.).

ALLOTYPE FEMALE. Loimwe, 10.vi.22, B.M. 1925–175, B.M. Type No. Rh. 16032 in B.M. (N.H.).

Neozephyrus letha Watson

Zephyrus letha Watson, 1897, *J. Bombay nat. Hist. Soc.* **10**: 664, pl. A, fig. 7.

Watson stated that this species was " described from a single male taken near Tiddim in the North Chin Hills, Burma, in May . . . at an elevation of about 5,000 ft ". The type was stated to be in the de Nicéville collection in Calcutta but was not to be found in 1956. Before the present rearrangement of the collection in the B.M. (N.H.) this name was placed as a subspecies of *scintillans*, but though the figure of the Un has the general appearance of the Un of this species, the very narrow border of the UpF and the comparatively broad border of the UpH and the inconspicuous discocellular bars on the Un, in the opinion of the author, rather preclude this, and it would seem preferable to leave it as a distinct species until the type specimen has been examined genitalically, if it is still extant, or more material is forthcoming from this part of Burma.

Swinhoe had a male specimen from the Khasia Hills, Assam, which he described and figured in Moore's *Lepidoptera Indica* 1911, **8** : 270, pl. 704, figs. 2 and *2a* as belonging to this species and though Swinhoe states that in his opinion it agrees with Watson's description exactly except for the somewhat darker underside this last point is in itself a significant difference in the light of observations made on this genus where the gr. c. is a very constant factor. This latter specimen is described below under the name *disparatus pseudoletha* ssp. nov.

DISTRIBUTION. Burma.

Neozephyrus teisoi Sonan

(Fig. 8)

Zephyrus teisoi Sonan, 1941, *Trans. nat. Hist. Soc. Formosa* **31** : 481.

Zephyrus formosanus Esaki, 1932, *Icon. Ins. Japan*, 969, f. 1910 (primary homonym; see Sibatani & Ito (1942)).

Zephyrus esakii Sonan, 1940, *Trans. nat. Hist. Soc. Formosa* **30** : 81 (pre-occupied by *esakii* Umeno for ♀ f. *smaragdinus*, 1937).

Zephyrus sanctissimus Araki & Sibatani, 1941, *Zephyrus* **9** : 94 (syn. Murayama & Sibatani, 1943, *Trans. Kansai ent. Soc.* **13** : 47).

This species is well figured in *Zephyrus*, 1941, **9** : pls. 7 and 8, figs. 3, 7.

In the male it is distinguished from *niitakanus* to which it has a superficial resemblance by the bluer green gr. c. Up ; the white fringe to the apex of the UpF ; the black border of the UpH (1 mm.) being twice as wide as that of UpF (·5 mm.) ; the browner and more contrasty gr. c. of the Un. The Up reflects yellowish-bronze when wet. The female belongs to the B form.

DISTRIBUTION. Formosa.

Neozephyrus vittatus Tytler ***comb. nov.***

(Fig. 9)

Zephyrus vittata Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 126, pl. 4, figs. 42, 43.

Holotype male and allotype female in B.M. (N.H.).

This species is at once recognizable by the UnH having a well-developed sub-basal bluish-white line from v. 8 to lower edge of cell, the discocellular line and the post-discal " W " being of the same colour. The male Up reflects bronze when wet. On the UnF of the female which belongs to the B form, there is an orange-buff patch at the end of the cell extending outwards and downwards in sp. 3 and 2 to the submargin.

DISTRIBUTION. Specimens in the B.M. (N.H.) from Kirbari, Naga Hills ; Kabru, Manipur ; and a pair, the male from the eastern frontier of Thibet, the female from Siao-lou, Szechwan both of these being taken by the native collectors of P. Déjean.

Neozephyrus marginatus sp. n.

(Figs. 10, 53, 63)

MALE. Frons, eyes, antennae, thorax and abdomen as *nigroapicalis* mihi; palpi not lined inwardly with white hairs so conspicuously as in the former, legs brown with scattered white scales, tarsi with white intersegmental rings.

UpF. Gr. c. deep metallic-blue-green; border 2·5 mm. broad, widening a little towards apex, ill-defined inwardly with gr. c. extending into it along the veins; fringe inwardly blackish-brown, outwardly white; length 22·5 mm.; reflects bronze when wet.

UpH. Gr. c. as F; border as F; no blue marginal line at tornus; tail black with white tip; fringe inwardly blackish-brown, medially white, outwardly paler brown darkening towards tornus.

UnF. Gr. c. Saccardo's umber; discocellular bar broad, slightly darker than gr. c. lined on either side with a fine white line; postdiscal line irregular, broad, white shaded inwardly and evenly with slightly darker gr. c.; submarginal band sepia in sp. 1 and 2 shading to gr. c. towards apex, very indistinctly lined inwardly and outwardly with whitish; antemarginal line whitish at tornus fading towards apex; margin sepia; fringe inwardly sepia, outwardly whitish.

UnH. Gr. c. as F; sub-basal bar slightly darker than gr. c., lined inwardly with white; discocellular bar as sub-basal; postdiscal line irregular, almost in line with discocellular bar in sp. 2 then bent outwards around this, at v. 7 stepped inwards and bent outwards again to costa; inner submarginal line very indistinct, irrorated with whitish, outer indistinctly irrorated outwardly as far as the white antemarginal line; large black-pupilled ocellus mikado-orange, almost confluent with tornal patch of same colour; fringe sepia lined with white medially, darker towards tornus.

HOLOTYPE MALE. Mo-Sy-Mien (Szechwan), Chasseurs indigènes 1894, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16033, Gen. No. T.G.H. 1955–129, in B.M. (N.H.).

This species is described from the unique holotype and may be separated by the broad black border and white fringes to the UpF and the very brown gr. c. and irregular postdiscal lines of the Un.

FEMALE. Unknown.

DISTRIBUTION. Szechwan.

Neozephyrus zoa de Nicéville ***comb. nov.***

(Figs. 11, 54, 64)

Zephyrus zoa de Nicéville, 1889, *J. Bombay nat. Hist. Soc.* **4** (6) : 167, pl. A, fig. 3.

Holotype male said to be in Calcutta, Tytler's supposed female neallotype is in fact a female of *N. desgodinsi* ssp. *dumoides* Tytler in B.M. (N.H.) (see *N. tytleri*).

The original specimen was taken by Mr. A. V. Knyvett on Tiger's Hill, Darjeeling, at 8,000 ft. on 26.vi.1888 and was apparently in the de Nicéville collection in Calcutta but was not to be found when Dr. Norman examined the collection in 1956. This species does not seem to have been taken again in this area and nothing more was heard of it until Tytler wrote about the specimens from Manipur which he thought to be this species.

However a male specimen has recently been presented to the museum by Mr. F. T. Vallins from the Antram collection which agrees with de Nicéville's description and figures and which differs quite considerably genitalically from Tytler's specimens but which nevertheless was also caught in Manipur, the exact locality not being stated so that now there seems no doubt that Tytler's material represents a distinct species (see under *tytleri* sp. n.)

The male Up reflects only a very dull green when wet.

DISTRIBUTION. Darjeeling (U.P.) and Manipur.

Neozephyrus tytleri sp. n.

(Figs. 12, 55, 56, 65, 66)

Zephyrus zoa de Nicéville, Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 129.

Tytler took a large series of a *Neozephyrus* which he thought to be the preceding species on the summit of Mt. Kabru in Manipur in July. The males differed from *zoa* in not having the black border of the UpF of even width as far as sp. 6 but widening out at v. 4 and Tytler expressed the opinion that he did not consider it advisable to make these specimens a subspecies until more were forthcoming from the Sikkim area. However, now that there is a male specimen in the B.M. (N.H.) also from Manipur which agrees more closely with *zoa* than Tytler's specimens and which differs considerably in its genitalia from his specimens there seems no reason for not elevating these to specific rank.

It may be stated here with regard to the females of the *duma* complex, that Tytler according to his identifications on the back of his data labels frequently misidentified his specimens and could have used no constant characters by which to separate them. This species is a case in point in that for his neallotype of *zoa* he selected a female of *desgodinsi dumoides* though the separation characters he gave in his note are quite correct : "I am however inclined to think that specimens which have the postmedian narrow white bands on both wings very narrow and straight and the terminal area of the hind wing below very sparsely irrorated with pale scales should be assigned to this species ". As well as these characters mentioned by him in the four female specimens that the B.M. (N.H.) possesses from his collection the ochraceous-orange bar at the end of the cell on the UpF extends down to sp. 2 in only one specimen and is distinctly divided into two sections by v. 4, and the discocellular bar on the UnF is not lined outwardly with white.

The male Up reflects a dull greenish-bronze when wet.

HOLOTYPE MALE. N. India, Manipur, vii.1913, W. H. Evans, B.M. 1935–7, B.M. Type No. Rh. 16034, in B.M. (N.H.).

ALLOTYPE FEMALE. Kabru, Manipur, E. 8000, 20.vii.12, Tytler coll., B.M. 1939–614, B.M. Type No. Rh. 16035, in B.M. (N.H.).

DISTRIBUTION. The types together with 32 males and 3 females all from Mt. Kabru, Manipur, 8,000 ft., in B.M. (N.H.).

Neozephyrus sandersi sp. n.

(Figs. 13, 57, 67)

MALE. Frons hairy, black brown with a median line of white hairs, lined on either side with white which encircles the eyes; palpi black dorsally, clothed with white scales and long hairs laterally and darker ventrally; eyes hessian-brown covered with yellowish hairs; antennae black with intersegmental rings of white, tips hessian-brown; thorax and abdomen covered with blackish hairs, those on the thorax having a greenish tinge; legs white, tarsi dark brown with white intersegmental rings.

UpF. Gr. c. metallic-bluish-green; border of even width (2 mm.) only broadening slightly at apex but extending basad a little along the veins and half-way along costa; fringe pale; length 20·5 mm.; reflects bronze when wet.

UpH. Gr. c. as F; border as F widening in sp. 7 to costa; indistinct metallic-blue marginal line on either side of v. 2; tail black with white tip 3·5 mm.; fringe pale at apex darkening outwardly towards tornus.

UnF. Gr. c. drab; discocellular bar darker, indistinctly and finely lined on either side with whitish; postdiscal line white, nearly straight, only slightly bent inwards at v. 4 and hooked outwardly at costa, shaded inwardly with hair-brown which broadens gradually from lower point at v. 2 to costa; between the postdiscal and submarginal lines there is an area slightly paler than gr. c.; submarginal band fuscous in sp. 1 and 2 becoming drab and indistinct towards costa, indistinctly irrorated with whitish; margin fuscous with fine white antemarginal line at tornus; fringe white at tornus darkening towards apex.

UnH. Gr. c. fuscous; disocellular and sub-basal bars slightly darker, inwardly lined with white, the latter more distinctly; postdiscal "W" white, not conjoined with white edge of submarginal line in sp. 2; between postdiscal and submarginal lines drab; submarginal line fuscous shaded inwardly with indistinct white crescents, outwardly irrorated with silvery white; fine white antemarginal line turning to sapphire-blue towards tornus; black pupilled ocellus in sp. 2 apricot-orange; tornus black with apricot-orange patch inwardly and basad along hind margin, this line inwardly edged with brilliant sapphire-blue; fringe white at apex darkening outwardly towards tornus.

HOLOTYPE MALE. Chungthang, EC. Sikkim, 6,000 ft., 11.vi.1944, Native collector for D. F. Sanders, B.M. 1956–423, B.M. Type No. Rh. 16036, Gen. No. T.G.H. 1955–164, in B.M. (N.H.).

PARATYPE MALES. One labelled "Sikkim", June, ex coll. Antram, B.M. 1956–34, B.M. Type No. Rh. 16037, in B.M. (N.H.) and two from the same locality as the holotype, taken on 9.vi.1944 and 16.vi.1944, in the D. F. Sanders collection.

This species is very similar to *vittatus* in general appearance but differs in having broader borders to the Up and not having the sub-basal bar extending to the median vein on the UnH (see Sanders, 1955, *J. Bombay nat. Hist. Soc.* **52** : 825).

DISTRIBUTION. Sikkim.

Neozephyrus intermedius Tytler ***comb. nov.***

(Fig. 14)

Zephyrus dumoides var. *intermedia* Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 127.

Described tentatively as a variety of *desgodinsi dumoides* by Tytler without examination of the genitalia. On examination these have proved this to be a genuine species which flies together with other members of the *duma* complex and which though the Up of the male resembles *vittatus* with comparatively narrow borders (1 mm.), the Un resembles that of *desgodinsi dumoides*. The female is very difficult to separate from the latter but it appears to have a paler irrorated line to the dark submarginal area of the UnH thus giving a silvery edge to the black " eyebrow " of the ocellus in sp. 2.

The male Up reflects bronze when wet.

DISTRIBUTION. Kabru, Manipur and Kirbari, Naga Hills, Assam.

Neozephyrus desgodinsi Oberthür ***comb. nov.***

(Fig. 15)

Thecla desgodinsi Oberthür, 1886, *Étud. d'Ent.* **11** : 21, pl. vii, fig. 54 ♀.
Zephyrus desgodinsi Oberthür, 1914, *Étud. Lep. Comp.* **9** (2) : 52, pl. clvi, fig. 2148, ♂.

Holotype female and allotype male in B.M. (N.H.).

In the male this species is separated from *duma*, which it closely resembles, by the broader border (2 mm.) on Up, the inner edge of which is not so sharply defined and the black extending more noticeably along the veins near the apex ; on the Un being slightly browner and the postdiscal " W " not broadly edged inwardly with darker brown. The female is not separable from *duma* externally. Apart from the types the B.M. (N.H.) has another pair, the male from Yunnan and the female from Siao-lou. Length of F in male is 22 mm., in female 21 mm.

The male Up reflects bronze when wet.

DISTRIBUTION. W. China, Szechwan and Yunnan.

ssp. ***dumoides*** Tytler ***comb. nov.***

(Fig. 16)

Zephyrus dumoides Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 127, pl. 14, fig. 39.

Holotype male in B.M. (N.H.).

Very similar to the western Chinese race on Up. The Un with much more contrast than *duma* due to the pale areas between postdiscal and submarginal lines of both F and H and the nearly unicolorous dark basal area inward of the postdiscal line of the H.

The male reflects bronze when wet and the F length is 21 mm., in the female 20 mm.

DISTRIBUTION. Sikkim and Manipur.

Neozephyrus duma Hewitson ***comb. nov.***

(Fig. 17)

Dipsas duma Hewitson, 1869, *Illustrations Diurnal Lep. Suppl.* **15**, pl. 6, fig. 15.

Holotype male in B.M. (N.H.).

In the male this species can be separated from its nearest relatives by its comparatively large size (22·5 mm. approx.), the golden tinge to the metallic-green gr. c. in many specimens and the border (1·3 mm.) widening only slightly towards the apex of the UpF and the silvery-brown gr. c. of the Un.

Apparently widely distributed and common in several areas. The B.M. (N.H.) has a long series from Sikkim, Darjeeling (U.P.), Bhutan, the Naga Hills, Manipur and one male from Yatung, Thibet. The last differs little from the Indian specimens except that the valva viewed laterally resembles *desgodinsi*. There is another specimen from Li-kiang, N. Yunnan which resembles the Thibetan specimen.

The male Up reflects bronze when wet.

DISTRIBUTION. Sikkim, Darjeeling, Bhutan, Manipur, Thibet and Yunnan.

Neozephyrus tatsienluensis Murayama

(Fig. 18)

Neozephyrus tatsienluensis Murayama, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 2, figs. 7 and 8.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16038, Gen. No. T.G.H. 1955–142.

Described from the unique male from the Oberthür collection which was originally placed under the name *scintillans* in the B.M. (N.H.) collection. It was then sent together with another specimen (*smaragdinus* ssp. *sikongensis* Murayama) as being representatives of the former to Dr. S. Murayama who at once recognized them as being distinct and having described them was kind enough to return them to the B.M. (N.H.).

This species is placed next to *duma* because of the similarity of the male genitalia. On external facies however it differs from that species in having the blue marginal line between tornus and sp. 2 distinct and white fringes to the F. The Un differs considerably in not having the deep shading of the postdiscal lines so wide and distinct and the " W " on the H very irregular and stepped inwards between v. 6 and v. 7. Length 21 mm.

The Up reflects yellowish-bronze when wet.

FEMALE. Unknown.

DISTRIBUTION. Szechwan, W. China.

Neozephyrus nishikaze Araki & Sibatani

Thecla nishikaze Araki & Sibatani, 1941, *Zephyrus* **9** : 91, pls. 7 and 8, fig. 1.

Holotype male in coll. Araki.

Apart from the original figure it is also figured by Murayama & Sibatani (1943, *Trans. Kansai ent. Soc.* **13** : pl. 3 (?), fig. 3 ♂; pls. 7 and 8 (?), fig. 5 ♀) and by

Murayama (1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 2, fig. 5). Through the kindness of Dr. Murayama this latter specimen, a paratype, has been examined as unfortunately the B.M. (N.H.) does not possess a specimen of this species. It has been most difficult to form an opinion as to its exact relationship with other species as the genitalia preparation of this specimen is in Japan. However the one view of the valva figured by Murayama & Sibatani (*ibid*) would seem to place it somewhere within the *duma* complex and the general appearance would confirm this, the disparity between the width of the borders of the Up being F 1·3 mm. and H 2 mm. On the Un this species rather resembles *sikkimensis* or *smaragdinus* ssp. *sikongensis* in tone but the bent postdiscal line at v. 4 of F and the wavy postdiscal of H seem good separation characters in both sexes.

The male Up reflects bronze when wet. The female belongs to the A form.

DISTRIBUTION. Formosa (Mt. Rara, Taihoku Pref.).

Neozephyrus yunnanensis sp. n.

(Figs. 19, 68, 69, 78, 79)

MALE. Frons hairy, brown with a few white hairs centrally, lined on either side with white which encircles the eyes ; palpi black above, white laterally and ventrally with long black hairs below ; eyes brown with whitish hairs ; antennae brownish-black with narrow white intersegmental rings, tips apricot-buff ; thorax with bronze-green hairs above and white below ; abdomen as thorax ; legs white with scattered brownish scales ; tarsi brown with intersegmental rings of white.

UpF. Gr. c. brilliant metallic-green ; border brownish-black, narrow (1 mm.) not broadening at apex ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border blackish-brown, broader than F (1·5 mm.) ; fringe white outwardly brown at tornus ; tail darker brown than border, tipped with white (4 mm.) ; a thin metallic-blue line on either side of tail.

UnF. Gr. c. drab ; discocellular bar darker than gr. c. lined on either side with white ; postdiscal line shaded narrowly and inwardly with darker drab as discocellular bar, irregular, curved inwards at each vein forming a series of crescents ; submarginal line hair-brown towards inner margin in sp. 1 and 2 becoming indistinct towards costa with paler drab outwardly ; antemarginal line very narrow ; fringe white.

UnH. Gr. c. as F ; sub-basal and discocellular bars slightly darker, lined inwardly with white ; postdiscal line white shaded as F, irregular not conjoined with inner white submarginal line in sp. 2 ; submarginal band broadly irrorated with white ; black pupilled cinnamon-buff ocellus in sp. 2 not confluent with tornal patch of same colour ; antemarginal line broad, white ; fringe as F.

FEMALE. Frons, palpi, eyes, antennae as male ; thorax, abdomen and legs browner.

UpF. AB form ; gr. c. blackish-brown with clay-coloured patch at end of cell ; cell and part of sp. 1*a*, 1, 2 and 3 a brilliant sapphire-blue and irrorated with same colour between v. 4 and costa around pale patch at end of cell ; fringe whitish, darker outwardly ; length 20·5 mm.

UpH. Gr. c. as F ; sapphire-blue patch in lower part of cell and base of sp. 2

and extending as far as submargin in sp. 1 ; indistinct blue line at base of tail ; margin darker at ends of veins ; fringe whitish, darker outwardly especially towards tornus where cilia have black tips ; tail blackish-brown with white tip (4 mm.).

UnF. Gr. c. benzo-brown with markings as male except that discocellular bar is not lined with white.

UnH. Gr. c. as F ; markings as male except that there is no sub-basal bar in sp. 7 ; the tornal patch and ocellus in sp. 2 are ochraceous orange, the black pupil of the latter appears to be more trilobate than orbiculate as it does in the male.

HOLOTYPE MALE. Bahand, Yunnan, Reçu du Pére Ouvrard, Missionnaire apostol à Oui-Si ou Wei-Si, Yunnan, Chine, en Janvier 1917, ex coll. Oberthür B.M. 1927–3, B.M. Type No. Rh. 16039, Gen. No. T.G.H. 1954–68, in B.M. (N.H.).

ALLOTYPE FEMALE. Same data as holotype. B.M. Type No.Rh. 16040, in B.M. (N.H.).

PARATYPE MALE. Tse-Kou, R. P. Dubernard 1895, ex coll. Oberthür B.M. 1927–3, B.M. Type No. Rh. 16041, Gen. No. T.G.H. 1954–67, in B.M. (N.H.).

DISTRIBUTION. Yunnan.

Neozephyrus smaragdinus Bremer

(Fig. 21)

Thecla smaragdina Bremer, 1861, *Bull. Acad. Sci. St-Pétersb.* **3** : 470.
Thecla smaragdina Bremer, 1864, *Mém. Acad. Sci. St-Pétersb.* **8** (1) : 25, pl. 3, fig. 5.
Thecla diamantina Oberthür, 1879, *Diag. Lep. Askold*, Rennes, p. 3.

The male type of *diamantina* in B.M. (N.H.).

The male is distinguished by the width of the borders of the Up, being narrow in the F and broad in the H, and the Un having broad white postdiscal lines, that of H being often bent outwards at sp. 7 and with the sub-basal and discocellular bars distinct ; the tornal spot and ocellus in sp. 2 confluent, forming a patch of apricot-buff ; Up reflects bronze-violet when wet.

The female belongs to the B form and is recognizable by the large patch of apricot-buff on the UpF which is more orbiculate than bilobate and the UpH having a tornal spot of the same colour.

The B.M. (N.H.) has a male from Chang Yang, C. China, a series of males and one female from Amur and a series of both sexes from Japan. There appears to be no noticeable difference between the specimens from these areas except that the female from Amur has a much smaller patch of buff at the end of cell of UpF. Specimens from Honshu have been divided into two subspecies by the Japanese.

DISTRIBUTION. C. China, Amur and Japan.

ssp. ***sikongensis*** Murayama

(Fig. 20)

Neozephyrus sikongensis Murayama, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 3, figs. 9, 10.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16042.

This subspecies was named from a male from Ta-tsien-lou in the Oberthür collection and may be separated by the Up having the appearance of the nominotypical race with the same disparity in width of the black borders of F and H (F ·75 mm., H 2 mm.) but having a metallic-blue marginal line at the base of tail present and on the Un the pale inner submarginal line of H not so wavy as in *smaragdinus smaragdinus*.

The Up reflects bronze when wet. The B.M. (N.H.) has three other specimens which have exactly the same data as the holotype.

DISTRIBUTION. Szechwan, W. China.

ssp. ***odakae*** Watari, 1929, *Zool. Mag. Tokyo* **41** : 187, figs. 10, 15.

(=*luxurians* Murayama 1953, *Tyô To Ga* (*Butterflies and Moths*) **4** : 2.)

According to Sibatani this subspecies has the female with large orange spots on UpF and with a spot also on UpH in tornal area rather more extreme than that figured by Esaki (1935, *Zephyrus* **6** : pl. 13, fig. 10).

DISTRIBUTION. Central Honshu (Nagano Pref.).

ssp. ***amoenus*** Murayama

Neozephyrus smaragdinus ssp. *amoenus* Murayama, 1954, *New Entomologist* **3** (4) : 34.

According to Murayama this differs from *odakae* in being somewhat smaller and lighter on the Un and with the margins of the male Up slightly narrower, and the female UpF having the orange marking generally smaller.

DISTRIBUTION. West Honshu (Kansai district).

There is a form of the female, *esakii* Umeno (1937, *Bull. Umeno ent. Lab. Kurume* **4** : 28, pl. 6, fig. 6) which according to Murayama and Sibatani (1943, *Trans. Kansai ent. Soc.* **13** : 55) belongs to the O form.

Neozephyrus tienmushanus Shirôzu & Yamamoto

(Figs. 22, 70, 71, 80, 81)

Chrysozephyrus tienmushanus Shirôzu & Yamamoto, 1956, *Sieboldia* **1** (4) : 387.

MALE. Frons dark brown with few white hairs medially, lined on either side with white which encircles the eyes ; palpi blackish-brown, striped with white inwardly and outwardly, tapering from base to apex of first joint, ventrally with a mixture of black and white hairs ; eyes dresden-brown covered with warm-buff hairs ; antennae black with white intersegmental rings, tips zinc-orange ; thorax dark brown covered with bronze-green hairs, paler beneath ; abdomen brown, paler beneath ; legs whitish with scattered brown scales, tarsi black with white intersegmental rings.

UpF. Gr. c. brilliant metallic-green ; border black, narrow, of even width (1 mm.) ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border as F ; fringe as F, darker outwardly towards tornus ; tail black tipped with white (5 mm.) ; indistinct blue marginal line at base of tail.

UnF. Gr. c. drab ; discocellular bar hair-brown, broad, lined on either side with white ; postdiscal line almost straight, broad, white shaded inwardly and broadly with hair-brown ; submarginal line hair-brown at tornus narrowing and becoming paler towards apex, outwardly lined with paler drab ; marginal line whitish becoming indistinct at apex ; fringe white.

UnH. Gr. c. as F; sub-basal bar white shaded outwardly with slightly darker gr. c.; discocellular bar distinct, shaded inwardly with white; postdiscal line almost straight between v. 2 and costa, only slightly bent outwards round cell, white shaded inwardly with hair-brown fading to gr. c.; submarginal band consisting of two lines of crescents, the inner narrow and whitish, the outer broader and irrorated with bluish white; black pupilled ochraceous-orange ocellus in sp. 2 not quite confluent with tornal patch of same colour which is lined inwardly with black and then sapphire-blue; tornal spot black; distinct white marginal line.

FEMALE. Frons, palpi, eyes, antennae and legs as male, thorax and abdomen Prout's brown, paler beneath.

UpF. B form; gr. c. Prout's brown, small patch of ochraceous-orange at end of cell and another smaller and more indistinct towards the middle of sp. 3; fringe brownish, paler towards apex and tornus; length 22 mm.

UpH. Gr. c. as F slightly paler towards costa; fringe whitish outwardly brown; tail as gr. c. tipped with white (6 mm.); blue marginal line reduced to a small spot on either side of v. 2.

UnF. Gr. c. buffy-brown paler towards inner margin, discocellular bar darker, edged inwardly with white which extends in a curve basad along subcostal vein as far as v. 11 very indistinctly edged outwardly with white; postdiscal line distinct, white, stepped slightly inwards at v. 4 and hooked outwards at costa, edged inwardly and broadly with darker buffy-brown which shades to gr. c.; submarginal band clove-brown in sp. 1 and 2 fading to gr. c. towards apex, outwardly edged with whitish which becomes indistinct towards costa as does the marginal line; margin slightly darker than gr. c.; fringe as UpF.

UnH. Gr. c. as F sub-basal bar white, curved inward from v. 8 to middle of cell then sharply outwards to v. 2; discocellular bar indistinctly edged inwardly with white; postdiscal line white, curved slightly inwards from v. 2 to costa; submarginal band as gr. c. with whitish crescents inwardly and irrorated outwardly and broadly with same colour; ocellus and tornal patch apricot orange; marginal line white becoming indistinct towards apex; tail black tipped white; fringe as UpH.

NEALLOTYPE FEMALE. West Tien-mu-shan, Prov. Chekiang, 12.vii.1932, H. Höne in Zoologische Forschungsinstitut, Bonn.

This species may be distinguished in the male by its size and narrowness of the Up borders and in the female by the smallness of the ochraceous patches on the UpF and the unusual discoidal and sub-basal bars on the Un.

DISTRIBUTION. Chekiang, E. China.

Neozephyrus chinensis sp. n.

(Figs. 23, 72, 73, 82, 83)

MALE. Frons, palpi, eyes, antennae, thorax and abdomen and legs as *tienmushanus*

UpF. Gr. c. metallic-green with a rather bronze-violet tint in certain lights; border black (1·2 mm.) hardly widening at apex; fringe brownish, outwardly white. Length 20 mm.

UpH. Gr. c. as F, border as F but very slightly wider, blue marginal line in sp. 1 and 2 ; fringe as F ; tail black tipped with white (4 mm.).

UnF. Gr. c. buffy-brown ; discocellular bar darker, lined on either side with white ; postdiscal line straight, silvery white edged inwardly with darker gr. c. of same width ; submarginal band clove-brown in sp. 1 and 2 fading to gr. c. towards apex, lined outwardly with white; marginal line white fading towards apex ; fringe brown outwardly white.

UnH. Gr. c. as F ; sub-basal bar slightly darker inwardly, edged with silvery white ; discocellular bar as sub-basal ; postdiscal line distinct, bent inwards in line with discocellular bar in sp. 2 and then outwards and almost straight to costa ; submarginal band as gr. c., lined inwardly with silvery crescents becoming indistinct towards apex, outwardly irrorated with broad silvery crescents which are bluish towards tornus ; black pupilled rufous ocellus in sp. 2, and tornal patch confluent inwardly of sp. 1*c* ; marginal line silvery ; fringe as F ; tail as F.

FEMALE. Frons, palpi, eyes, antennae and legs as male, thorax and abdomen sepia, paler beneath.

UpF. AB form ; gr. c. sepia, metallic-blue in cell and sp. 1*a*, 1 and extreme base of sp. 2 and small pinkish-cinnamon patches at end of cell and sp. 3 as in *tienmushanus* fringe white ; length 18·5 mm.

UpH. Gr. c. as F with a few blue scales scattered in lower part of cell and inwardly to a slightly darker spot corresponding to the pupil of the ocellus in submargin of sp. 2 of Un and on either side of v. 2 in the margin ; fringe brownish inwardly and outwardly, with whitish medially, darker towards tornus which is black ; tail black with white tip (4 mm.).

UnF. Gr. c. a little darker than male but otherwise similar.

UnH. As UnF.

HOLOTYPE MALE. Se-Pin-Lou-Chan, Ya Tcheou, chasseurs indigènes 1893, ex Oberthür coll. B.M. 1927–3, B.M. Type No. Rh. 16043, Gen. No. T.G.H. 1954–66, in B.M. (N.H.).

ALLOTYPE FEMALE Tien-Tsuen; chasseurs indigènes du P. Dèjean, 1901, ex Oberthür coll., B.M. 1927–3, B.M. Type No. Rh. 16044, in B.M. (N.H.)

EIGHT PARATYPE MALES : (1) Thibet, Tsekou, R. P. Dubernard, ex coll. Oberthür B.M. 1927–3, (2) " China " J. Gurney-Barclay coll. B.M. 1938–719, (5) Wychang, Joicey Bequest B.M. 1934–120, in B.M. (N.H.).

This species is very similar in appearance to *scintillans* but it is closely related to *tienmushanus* having the same form of genitalia. The genitalia of all the males have been examined and they show very slight variation especially amongst the Wychang specimens ; the facies of these differs from the Szechwan specimens in having slightly narrower borders and a more "brassy" tinge to the gr. c. which does not reflect brilliant violet when wet but has a more "bronzy" tone, but there is, however, one specimen which matches the Szechwan specimens exactly except for the reflection when wet which may illustrate that the change of colour may be due to a genetical difference or to a difference in climate or pabulum of the two localities. But for this specimen the Wychang examples would appear to represent a subspecies.

DISTRIBUTION. Szechwan and Wychang, China.

Neozephyrus souleana Riley ***comb. nov.*** ,

(Figs. 24, 74, 84)

Thecla souleana Riley, 1939, *Novit. zool.* **41** : 357.

Holotype male in B.M. (N.H.).

The B.M. (N.H.) apart from the holotype has three other males all from the type locality, Yarégong, Szechwan, W. China. It may be separated by the width of the borders of the Up being 2·5–3 mm. and having white fringes, and on the Un being a unicolorous buffy-brown. In the original description the length of the fore wing was said to be 15 mm. compared with *coruscans* 18 mm., both are actually 5 mm. longer than as stated, being 20 mm. and 23 mm. respectively.

THE FEMALE is unknown.

The male Up reflects violet when wet.

DISTRIBUTION. Szechwan.

ssp. ***angustimargo*** ssp. n.

(Figs. 75, 85)

There are a male and two female specimens from Yunnan in the B.M. (N.H.) and a series of eight males from the same province in the Höne collection. The genitalia of all the males have been examined and they appear very similar to *souleana* but externally the insects differ in that they have narrower borders (1·5 mm.) and brown fringes which are paler towards the tornal areas of the fore wings but on the Un they resemble *souleana*. The two females resemble *chinensis* in size and coloration on the Up and belong to the AB form, but on the Un however they match their males. These apparently belong to a distinct subspecies and I propose the above name for them.

The male Up reflects violet when wet.

HOLOTYPE MALE. Tsekou, 1900, R. P. J. Dubernard, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16045, in B.M. (N.H.).

ALLOTYPE FEMALE. Tsekou, 1895, R. P. J. Dubernard, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16046, in B.M. (N.H.). This specimen was figured as *Zephyrus zotelistes* Oberthür in *Etud. Lép. Comp.* 1913–14, **9** : pl. 254, fig. 2147.

PARATYPE FEMALE. Thibet, Tchang-kou, Chasseurs chinois, été 1892, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16047, in B.M. (N.H.).

PARATYPE MALES. Seven from Li-kiang Prov., N. Yunnan (4) 14, (1) 15, (1) 16, (1) 20.vii.1935, H. Höne, in Höne collection, Bonn.

There is a male in the Höne collection that was taken with the paratype males which differs in no way from them in general appearance but the genitalia are abnormal being not so robust and having the falces more hooked (Fig. 25). Apart from these genitalic differences there seems to be no other character by which this specimen may be separated so that it would be better to leave it undescribed so that if at some later date more specimens are forthcoming with this same genitalic formation then they may be considered as representing an undescribed species.

DISTRIBUTION. Yunnan.

Neozephyrus disparatus sp. n.

(Figs. 26, 76, 86)

MALE. Frons, palpi, etc. as *yunnanensis*.

UpF. Gr. c. metallic-blue-green with black-brown border (1·3 mm.) ; fringe inwardly black-brown, outwardly white ; reflects yellowish-bronze when wet.

UpH. Gr. c. as F ; border broader (2·3 mm.) indistinct metallic-blue marginal line on either side of v. 2 ; fringe as F but outwardly darker towards tornus ; tail black, tipped with white (5 mm.) ; length 21 mm.; reflects yellowish-bronze when wet.

UnF. Gr. c. pale drab ; discocellular bar not distinct ; postdiscal line slightly wavy, narrow, white inwardly lined with darker gr. c.; submarginal band almost reduced to the two dark spots in tornal area, that in sp. 1 nearly split in two by submedian fold, that in sp. 2 being more rectangular in shape ; marginal line white, only visible at tornus, becoming indistinct above sp. 2 ; fringe as UpF.

UnH. Gr. c. as F ; discocellular bar as F ; postdiscal line a little wider than that of F but otherwise similar ; submarginal band irrorated with bluish-white scales in form of two lines of crescents, the inner narrower and more distinct than the broader, more diffuse outer line ; black-pupilled apricot-orange ocellus in sp. 2 not touching tornal patch of same colour, sapphire-blue line inwardly of ocellus and patch ; tornus black ; distinct white marginal line ; fringe as UpH.

HOLOTYPE MALE. Reçu de la Mission catholique de Weisi, Yunnan en 1923 (Chasse de 1922) ex Oberthür coll. 1927–3, B. M. Type No. Rh. 16048, in B.M. (N.H.).

PARATYPE MALES. Three (1) Tsekou, Père Ouvrard 1914, B.M. Type No. Rh. 16049 ; (1) Tsekou, P. Dubernard 1903 ; (1) Yunnan, Tsekou, Bords du Mékong, R. P. Valentin, Chasse de 1920, B.M. Type No. Rh. 16050, Gen. No. T.G.H. 1954–74. All ex Oberthür coll. 1927–3 in B.M. (N.H.). This species resembles *tatsienluensis* on Up but has broader borders to the H and may be separated from that species by the Un having the discocellular bars barely visible.

FEMALE. Unknown.

DISTRIBUTION. Yunnan, W. China.

ssp. ***pseudotaiwanus*** ssp. n.

The male is similar to ssp. *interpositus* in size (19 mm.) but has very narrow borders to the wings (F ·4 mm., H 1 mm.) and white fringes. The Un is the same as *disparatus disparatus*. The female belongs to the AB form and on the Up resembles *chinensis* but with the sapphire-blue in sp. 2 extending outwards nearly as far as that in sp. 1 of F, and having only a few blue scales in cell and sp. 1 of H. The blue marginal line on either side of v. 2 distinct. Un gr. c. buffy-brown with markings similar to male.

As the name would suggest this subspecies has been confused with *mushaellus* (nec *taiwanus* Wile.) until the present, due no doubt to the shortage of Formosan material of this genus in Britain and the fact that no comparison of material from this area with the allotype of *taiwanus* has ever been made. Through the kindness of

Dr. S. Murayama and other Japanese workers the shortage of material has at last been partly rectified and consequently it has been possible to make critical comparisons with the types in the collection here.

This subspecies may be separated from *mushaellus* in the male by its smaller size (19 mm. compared with 22·5 mm.), the golden-green gr. c. of the Up, and the broader border to the UpH (1 mm. compared with ·5 mm.). The submarginal black spots on UnF are three in number, a twin in sp. 1 and a single one, slightly paler, in sp. 2; *mushaellus* on the other hand has a large spot in sp. 1 and a very indistinct smear of darker colour in sp. 2.

The figure in *Bull. lep. Soc. Japan*, 1946, **1** (3): 86 was reprinted in *Tyô To Ga* (*Butterflies and Moths*) 1951, p. 21. Though originally a poor reproduction it certainly represents a male *pseudotaiwanus* and that in *Trans. Kansai ent. Soc.*, 1943, **13** (1): pl. 7–8 (?), fig. 1 is a good figure of the female.

The male Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Mareppa, Formosa, 17.v.1942, ex Murayama coll., B.M. 1956–375, B.M. Type No. Rh. 16053 in B.M.(N.H.).

ALLOTYPE FEMALE. Sankakuho, Formosa (Pref. Taichu) 20.v.1942. In S. Murayama collection.

PARATYPE MALES. (1) Sankakuho, Formosa (Pref. Taichu) 28.v.1942. In S. Murayama collection. (1) Sankakuho, Formosa (Pref. Taichu) 20.v.1942. In S. Murayama collection. (1) Hakku, Formosa 23.v.1942, ex coll. Murayama, B.M. 1955–560, B.M. Type No. Rh. 16054, Gen. No. T.G.H. 1955–153, in B.M. (N.H.).

DISTRIBUTION. Formosa.

ssp. ***pseudoletha*** ssp. n.

Ruralis letha Watson, Swinhoe 1911, in Moore's *Lepidoptera Indica* **8** : 270, pl. 704, figs. 2 and 3.

Named from the unique specimen figured and described by Swinhoe from the Khasia Hills, Assam and which was thought by him to represent *letha*. Unless Watson's original figure is hopelessly inaccurate there seems to be no reason why this specimen should not be considered distinct (see *letha*). The genitalia place it at once with *disparatus*. Compared with the Yunnan race it is smaller, being only 18·5 mm., the borders on Up are narrower (F ·5 mm., H 1·5 mm.), the Un is slightly browner, the discocellular bars are a little more distinct and the fringes are brown.

The Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Assam, Khasia Hills, Joicey Bequest, Brit. Mus. 1934–120, B.M. Type No. Rh. 16051, Gen. No. T.G.H. 1955–173, in B.M. (N.H.).

DISTRIBUTION. Assam.

ssp. ***interpositus*** ssp. n. (Figs. 77, 87)

Named from the unique male taken by Antram in Sikkim and presented to the B.M. (N.H.) by Mr. F. T. Vallins, this subspecies is intermediate in several characters between *disparatus disparatus* and *pseudoletha*, being almost the same size as the latter (19 mm.) but having the black borders nearly as broad as the former (F 1 mm., H 2 mm.). The markings on the Un resemble those of *pseudoletha*. The genitalia differ slightly from the Assam specimen having the tegumen a little broader laterally and the saccus a little longer.

The Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Sikkim, June (ex Antram coll.), B.M. 1956–34, B.M. Type No. Rh. 16052, Gen. No. T.G.H. 1955–175, in B.M. (N.H.).

DISTRIBUTION. Sikkim.

Neozephyrus rarasanus Matsumura

(Fig. 45*a*)

Zephyrus rarasanus Matsumura, 1939, *Insecta matsum.* **13** : 110.

Holotype male in coll. S. Hirayama.

Through the kindness of Dr. T. Shirôzu of Kyushu University it has been possible to examine a male of this very rare species. The specimen examined was taken on the same day—20.vi.1938 on Mt. Rara—as the type.

In general appearance it resembles *pseudotaiwanus* but has slightly broader borders to the wings (F ·75 mm., H 1·75 mm.), that on F widening a little at apex. The Un is very similar except for the discocellular bars which are a little more distinct. The drawing of the valva in *Trans. Kansai ent. Soc.* 1943, **13** (1), 54 is slightly twisted from the ventral view towards the lateral and consequently does not show the apical hook which places this species next to *disparatus*, that in *rarasanus* being not quite so well developed but sharply cut off at the tip. The falces are very similar in shape, as is the aedeagus, which is much slimmer than that of *pseudotaiwanus*.

Apart from the original figure of the male there is a half tone of both sexes in *Zephyrus* 1941, **9** : 7 and 8, figs. 2 and 6.

The male Up reflects violet when wet. The female apparently belongs to the A form.

DISTRIBUTION. Formosa (Mt. Rara).

GROUP 2

Neozephyrus mushaellus Matsumura

(Fig. 28)

Zephyrus mushaellus Matsumura, 1938, *Insecta matsum.* **13** : 44.
Zephyrus taiwanus Wileman, 1909, *Annot. zool. japan* **7** : 89 (*partim*, ♂).
Zephyrus coruscans ssp. *takasagoensis* Nire, 1920, *Zool. Mag. Tokyo* **32** : 374 (*partim*, ♀).
Zephyrus taiheizana Nomura, 1931, *Zephyrus* **3** : 59, figs. 2*b*, *c*, 4*c*.

Wileman, when he described *taiwanus*, took a female as his holotype since at the time of description he had only this one sex before him (1908, *Annot. zool. japan* **6** : 324). The following year he described what he thought to be the male but which actually has proved to be *mushaellus*. It would not be out of place to mention here that the holotype female of *taiwanus* on examination has proved to be exactly the same as *takasagoensis* so that the latter name will have to sink as a synonym. Furthermore the figure of the allotype female of *takasagoensis* in *Trans. Kansai ent. Soc.* **13** (1), pl. 5 (?) lower fig. 2 agrees with and must belong to *mushaellus*.

The differences between the male of this species and that of *pseudotaiwanus* have already been mentioned under the latter name and the female according to Sibatani & Murayama (as *takasagoensis*) may belong to either form B or AB. The male is figured as *taiwanus* in *Zephyrus* 1941, **9** : pls. 7 and 8, fig. 5. The Up reflects greenish gold when wet.

Esaki (1937, *Zephyrus* **7** : 95) states that *taiheizana* is a synonym of *takasagoensis* ; apparently the name was based on two specimens, the " ♂ " being a ♀ of *taiwanus* (*takasagoensis*) and the ♀ being a ♀ of *mushaellus*.

DISTRIBUTION. Formosa.

ssp. ***rileyi*** Forster

(Fig. 27)

Zephyrus rileyi Forster, 1940, *Mitt. münch. ent. Ges.* **30** : 871, pls. 22–23, figs. 1 and 2.

Holotype male and allotype female and two paratype females in Zoological Museum, Berlin from Kwangtung Province, China.

Through the kindness of Dr. R. Mell and Dr. E. M. Hering the author has been able to examine the type series. The male genitalia have been examined and there is no doubt that this constitutes the Chinese race of *mushaellus* (Sibatani, 1946, *Bull. lep. Soc. Japan* **1** (3) : 86).

The male may be distinguished by the deep bluish-green of the gr. c. which turns to a greenish-gold when wet, very similar in tint to *niitakanus* when dry and the narrow and broken postdiscal line of the UnF which becomes obsolescent towards the costa. The length is 23·5 mm.

The female varies from form A to AB or B and may be distinguished by the same difference in the postdiscal line of the UnF as the male. It measures 22·5 mm. in length. The Höne collection has two females, one from Linping, Kwangtung (AB), the other from West Tien-Mu-Shan (1,600 m.) Chekiang Prov. (B). The B.M. (N.H.) also has two females, one from Kwanhsien, W. China the other from Siao-lou, Szechwan both belonging to the B form. The former has a small buff spot in sp. 2 towards the margin of the UpH similar to some specimens of *smaragdinus*.

DISTRIBUTION. China.

Neozephyrus hisamatsusanus Nagami & Ishiga

(Fig. 29)

Zephyrus hisamatsusanus Nagami & Ishiga, 1935, *Fukuoka Hakubutsugaku Zasshi.* **1** : 303.

This species is well figured in *Zephyrus* 1937, **7** (2) : pl. 9, figs. 4–5. It may be separated at once by the broad white postdiscal line of the UnH being in the form of a " V " not a " W " as is usual. The B.M.(N.H.) has only one male labelled Kitayama, Sugitoge Pass, Kyoto, 11.vii.1947. It measures 19·5 mm. and reflects violet when wet on Up. The female belongs to the AB form.

DISTRIBUTION. Japan.

Neozephyrus suroia Tytler ***comb. nov.***

(Fig. 30)

Zephyrus suroia Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 125, pl. 4, figs. 30, 31.

Holotype male and allotype female in B.M. (N.H.).

A very distinct species and the only representative of the *taxila-coruscans* group occurring within the Indian region (*sensu lato*), having pale markings in the discal area of both UnF and UnH. The cell bars, as is usual in this group, are not darkened, but the whitish lines inward of these are greatly widened and in the H the sub-basal bar in sp. 7 extends as far as the base of v. 2 on the cubitus or median vein of cell. All the white lines on the Un are broad and have a bluish tint and contrast sharply with the buffy-brown gr. c. The UpH of the male has the blue marginal line widened and a patch of the same colour basad in sp. 7. The female belongs to the B form though in one specimen in the B.M. (N.H.) there is a very indistinct reddish-brown smear in the middle of sp. 3.

The male Up reflects brilliant violet when wet.

DISTRIBUTION. Only recorded from Mt. Suroifui in E. Manipur at 8,000–9,000 ft.

Neozephyrus dubernardi Riley ***comb. nov.***

(Figs. 31, 90, 99)

Thecla coruscans ssp. *dubernardi* Riley, 1939, *Novit. zool.* **41** : 356.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16055, Gen. No. T.G.H. 1955–122.

An examination of the genitalia has proved this to be a genuine species. It may be separated from *coruscans* by the narrow and more irregular markings on the Un, the postdiscal line of the F closely resembling that of *suroia,* and the rather brownish white fringes. The length is 21 mm.

The Up reflects violet when wet.

DISTRIBUTION. Only the holotype is known, from Tsekou, Yunnan.

Neozephyrus coruscans Leech

(Fig. 32)

Zephyrus coruscans Leech, 1893, *Butterflies of China, Japan and Corea* **2** : 373, pl. 27, figs. 7 and 8.

Type male and allotype female in B.M. (N.H.) from Ni-tou, W. China.

Apart from Leech's excellent figures this well-known W. Chinese species is figured by Seitz (*Macrolep. World* **1** : 73). Its size, several of the males in the B.M. (N.H.) being 24 mm. in length, the broad black margins to the male Up, the pure white postdiscal lines, and the large apricot-orange ocellus and tornal patch on the Un separate this species from any previously described.

The female belongs to the B form and the male Up reflects violet when wet.

DISTRIBUTION. W. China, Siao-lou, Moupin, Ta-tsien-lou, Tay-Tou-Ho, Omei shan and Ni-tou.

Neozephyrus helenae sp. n.

(Figs. 33, 88, 89, 97, 98)

On examination, the genitalia of the specimens under the preceding species in the B.M. (N.H.) were found to comprise two forms, and on sorting the specimens concerned into their respective forms it was obvious that there was another species involved as well as *coruscans*, with *helenae* the commoner of the two. Compared with *coruscans* this species may be separated by the following characters:

Male UpF. The gr. c. is bluer-green; the black border is narrower in sp. 2 being 1·5 mm. compared with 2 mm. in *coruscans* giving the wing the appearance of having a wider black apex. The gr. c. reflects violet when wet.

Male UpH. The blue marginal line on either side of v. 2 at base of tail is distinct whereas in *coruscans* it is often absent or reduced to a few scales at v. 2.

FEMALE. Belongs to B form; only separable by the blue marginal line on UpH being as in the male, for the Un in both sexes are as in *coruscans*.

HOLOTYPE MALE. Siao-lou, 1900, Chasseurs indigènes, ex Oberthür coll. 1927–3, B.M. Type No. Rh. 16056, in B.M. (N.H.).

ALLOTYPE FEMALE. Same data as holotype. B.M. Type No. Rh. 16057, in B.M. (N.H.).

PARATYPES. Forty-four males and 45 females from Siao-lou, Ta-tsien-lou, Moupin, Tien-tsuen, Si-Pin-Lou-Chan, Kwanshien, Ni-tou, W. China, in B.M. (N.H.).

DISTRIBUTION. W. China.

There are several female specimens in the series in the B.M. (N.H.) that have scattered purple-violet scales in sp. 1*a* of UpF. In two or three specimens these are extended into the basal area of sp. 1 forming a diffuse patch of this colour. For this, the AB form, I propose the name: ***violescens*** ♀ forma n.

HOLOTYPE FEMALE. Siao-lou, 1900, Chasseurs indigènes, ex Oberthür coll. B.M. 1927–3, B.M. Type No. Rh. 16058, in B.M. (N.H.).

Neozephyrus taiwanus Wileman

(Figs. 34, 91, 100)

Zephyrus taiwanus Wileman, 1908, *Annot. zool. japan* **6** : 324 (♀).
Zephyrus coruscans takasagoensis Nire, 1920, *Zool. Mag. Tokyo* **32** : 324.

Holotype female and allotype male in B.M. (N.H.).

As already mentioned under the name *mushaellus*, when Wileman described *taiwanus* he had only the female before him (1908); a year later he described a male which he thought to be this species but which actually belongs to Matsumura's species and until the present examination of the types concerned was carried out much confusion has existed in the synonymy of the various species inhabiting Formosa.

Both sexes of this species are well figured in *Zephyrus*, 1937, **7** : pl. 9, figs. 1 and 2 under the name *takasagoensis*, the female belonging to the A form. Apparently there is an AB form of the female which was named *tattakana* Matsumura (1929, *Insecta matsum.* **3** : 101), but since the type of *taiwanus* belongs to this form the former name will have to be sunk.

This species may be distinguished in the male by the broad black apical area to UpF and by the UnH having the white postdiscal " W " running straight from the middle of sp. 2 to costa half-way between sub-basal bar and submarginal band, the latter being bluish. The female is separated by the same UnH characters as the male.

The male Up reflects violet when wet.

DISTRIBUTION. Formosa.

Neozephyrus taxila Bremer

(Fig. 35)

Thecla taxila Bremer, 1861, *Bull. Acad. Sci. St-Pétersb.* **3** (7) : 470.

In the past this species was divided into several subspecies :

taxila Bremer (*ibid.*) from Manchuria, Hokkaido, and according to Riley (1939, *Novit. Zool.* **41** : 356) also from the higher elevations of Honshu.

regina Butler, 1881, *Proc. zool. Soc. Lond.* 853 from Toshima and Iburi, Hokkaido.

sachalinensis Matsumura, 1925, *J. Coll. Agric. Sapporo* **15** : 103 from Sakhalin.

japonica Murray, 1875, *Ent. mon. Mag.* **11** : 169 from S. Japan and Formosa. Type in B.M. (N.H.).

monticola Shirôzu, 1952, *Sieboldia* **1** (1) : 22, pl. 7, figs. 36, 40 from the montane regions of Honshu.

koreana Riley, 1939, *Nov. zool.* **41** : 356 from Korea. Type in B.M. (N.H.).

The Japanese workers on this genus were correct when they synonymized *regina* and *sachalinensis* with *taxila taxila*, and *monticola* and *koreana* with *japonica* as according to them and after examination of the material in this museum these do not appear to be separable either on external facies or genitalia. Consequently it would seem that, excluding the elevation factor, *taxila taxila* is to be found to the north of latitude 42° and *taxila japonica* to the south of this line both on the mainland of Asia and in the Japanese islands southward to Formosa. As would be expected the northern race is smaller (18 mm.) with paler gr. c. and narrower markings on Un while *japonica* is larger (20 mm.) and more boldly marked and has a browner gr. c. on Un. In the two subspecies various forms of the female, which intergrade one with the other, have been named and they are given below with their appropriate form letter(s) :

taxila taxila Bremer (= syn. *unicolor* Rühl 1892, *Pal. Grossschmett.* **1** : 188)	Form O
,, ,, *maculata* Rühl (*ibid.*)	B
,, ,, *regina* Butler (1881) (= syn. *bellus* Rühl. (*ibid.*))	AB
,, ,, *quercus* Rühl (= syn. *smaragdinoides* Staudinger (?))	A
,, *japonica* Murray (1875)	O
,, ,, *pryeri* Esaki, 1935, *Erkl. Pryer Rhop. Nihon.* 10	AB
,, ,, *fasciata* Janson, 1878, *Cist. Ent.* **2** : 272	A
,, ,, *leechi* Esaki, 1938, *Zephyrus* **7** : 229	B

There is an aberration *sidemina* Kardakoff (1928, *Ent. Mitt.* **17** : 271) (= syn. *harukii* Hori & Tamanuki, 1937, *Karahuto Tyuo Sikensyo Hokoku Konuma* **19** : 177) which has the white postdiscal lines of the Un of both wings broadened outwardly as far as the submarginal areas forming a white band on each wing. This aberration was originally described from a male from Amur and is figured in Seitz (*Macrolep. World* **1** : *Suppl.* pl. 15*b*) and the B.M. (N.H.) has a female not quite so extreme from Manchuria and a male from Hokkaido so that it is recurrent and occurs in both sexes.

The male Up reflects a very brilliant violet when wet.

Distribution. Manchuria, Amurland, Korea, Japan and Formosa.

GROUP 3

This " group " consists of nine species confined to the Indian side of the Himalayas and the bordering countries. They form a compact group characterized by the males having the Up gr. c. a paler green sometimes shot with violet with the black borders either the same width in both F and H or broader in the F. The females have the orange-brown patch of the AB form replaced with white and the blue much more extensive, often covering the disc of the H from the submarginals of the anal area to v. 6 and of a much more blue-violet tint. The Un gr. c. of both sexes is usually a silvery-grey with the discoidal bars distinct. In size they are generally smaller than the other representatives of *Neozephyrus*, the largest specimen of *syla* being 20 mm., the more normal being approximately 18 mm. Genitalically the males exhibit a type of variation very similar to that of the previous sections of the genus.

Neozephyrus birupa Moore *comb. nov.*

(Figs. 36)

Dipsas birupa Moore, 1877, *Ann. Mag. nat. Hist.* **20** : 51.

Types in B.M. (N.H.).

Specimens in B.M. (N.H.) from Simla, Mussoorie, Raniket and Kumaon; also a male labelled " Sikkim ", and another pair from " Silhet " (Sylhet, Assam) which may be incorrectly labelled as Evans gives the distribution as Simla to Kumaon. Also in the collection are specimens from Nepal (F. M. Bailey) where it is widely distributed from Chandragiri, Sissagarhi, Katmandu and Nargarkot ; these have the Un more silvery than those from other areas.

The male Up reflects violet when wet.

Neozephyrus bhutanensis sp. n.

(Figs. 37, 96, 105)

The male UpF very similar to *birupa* but with the border (2 mm.) broader than that of H (1·5 mm.) ; length 18 mm.; fringe white from tornus to v. 2 then brown to apex. On the UpH the fringe is white and the tail is as in *birupa* (2·5 mm.). On the Un it is very similar to *triloka* but with the markings slightly broader, and the black ocellus and tornal spot of H are more prominent. The Up reflects violet when wet.

HOLOTYPE MALE. N. India, Bhutan, Trongsa, 6,500 ft., 7.vii.1933, F. Ludlow & G. Sheriff, B.M. 1933–634, B.M. Type No. Rh. 16059, Gen. No T.G.H. 1954–100, in B.M. (N.H.).

PARATYPE MALE. Dhimsa, Nepal, 22.x.1935, B.M. 1956–335, B.M. Type No. Rh. 16060, in B.M. (N.H.).

DISTRIBUTION. Bhutan and Nepal.

Neozephyrus triloka Hannyngton ***comb. nov.***

(Figs. 38, 94, 95, 103, 104)

Zephyrus triloka Hannyngton, 1910, *J. Bombay nat. Hist. Soc.* **20** (2) : 367.

Holotype female and neallotype male in B.M. (N.H.).

Swinhoe in 1911 in Moore's *Lepidoptera Indica* **8**, p. 269 treated this species—the name wrongly spelt as *Ruralis trilocha*—as being only a dry form of the female of *syla* and subsequent authors have followed Swinhoe. Fortunately the late Lord Rothschild acquired Hannyngton's collection for the Tring Museum and when the author came to examine and amalgamate the material it was found that Hannyngton was quite correct when he described *triloka* as a distinct species. W. H. Evans has published a note about this in the *J. Bombay nat. Hist. Soc.* 1955, **53** (1) : 144.

Since the male has not been described a brief description is given below :

UpF. Gr. c. the typical powdery green ; black border narrow (1–1·25 mm.) ; fringe whitish ; length 17 mm.; reflects violet when wet.

UpH. Gr. c., border and fringe as F ; tail black tipped white (2·5 mm.).

UnF and UnH. Very similar to *bhutanensis* but with narrower dark markings and the black ocellus in sp. 2 of H much reduced and with no orange in sp. 2 or tornus.

NEALLOTYPE MALE. Kumaon, August, coll. Hannyngton, Rothschild Bequest, B.M. 1939–1, B.M. Type No. Rh. 16061, Gen. No. T.G.H. 1954–99, in B.M. (N.H.).

DISTRIBUTION. Only recorded from the Kumaon District, U.P., India. Apart from the types the B.M. (N.H.) possesses two females and a male, the latter from the Champion collection.

Neozephyrus jakamensis Tytler ***comb. nov.***

(Fig. 39)

Zephyrus jakamensis Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130, pl. 4, figs. 32, 33.

Holotype male and allotype female in B.M. (N.H.).

Apparently a local species inhabiting the Naga Hills, Manipur. Only Tytler's small series of males and the allotype female known.

The male Up reflects reddish-bronze when wet.

DISTRIBUTION. Manipur.

Neozephyrus syla Kollar ***comb. nov.***

(Fig. 40)

Thecla syla Kollar, 1848, *Hügel, Kaschmir* **4** (2) : 414, pl. 4, figs. 7, 8.

This species is widely distributed and not rare in India and has much the same distribution as *birupa*, except that it extends westward into Afghanistan. The B.M. (N.H.) has a male labelled " Sikkim " which may be incorrectly labelled as Evans only records it from Safed Koh and Chitral to Kumaon.

The male Up reflects violet when wet.

DISTRIBUTION. Afghanistan to Kumaon.

Neozephyrus assamicus Tytler ***comb. nov.***

(Fig. 41)

Zephyrus assamica Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130.

Holotype male and allotype female in B.M. (N.H.).

This species was considered to be a subspecies of *syla* by Evans (*Identification of Indian Butterflies*) and superficially the two species are rather similar but the genitalia are very different in several respects. However, there is no doubt that they are closely related, for both have the exceptionally long aedeagus, but the saccus in this species is only about half the length of that of *syla*.

The male Up reflects violet when wet.

DISTRIBUTION. Specimens in B.M. (N.H.) from Sikkim, Darjeeling, Assam, Manipur and Bhutan, and there is a female from Nepal in the F. M. Bailey coll.

Neozephyrus kirbariensis Tytler ***comb. nov.***

(Fig. 42)

Zephyrus kirbariensis Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130, pl. 4, figs. 36, 37.

Holotype male and allotype female in B.M. (N.H.).

The male reflects reddish-bronze on the Up when wet.

DISTRIBUTION. Specimens in B.M. (N.H.) from the same areas as *assamicus* namely Phesima, Kirbari, Jakama in the Naga Hills and Kabru in Manipur, but not from Sikkim.

Neozephyrus paona Tytler ***comb. nov.***

(Fig. 43)

Zephyrus paona Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 131, pl. 4, figs. 34, 35.

Holotype male and allotype female in B.M. (N.H.).

The male Up reflects violet when wet.

DISTRIBUTION. Only the types known, the male from Mt. Kabru, the female from Paona Peak, Manipur.

Neozephyrus khasia de Nicéville ***comb. nov.***

(Fig. 44)

Zephyrus khasia de Nicéville, 1890, *Butterflies of India* **3** : 301.
Zephyrus khasia de Nicéville, 1890, *J. Bombay nat. Hist. Soc.* **5** : 210, pl. E, fig. 4.
Zephyrus khasia de Nicéville, Tytler in 1915, *J. Bombay nat. Hist. Soc.* **24** : 131, pl. 4, fig. 44.

Holotype male and neallotype female (Tytler) in B.M. (N.H.).

Originally described by de Nicéville from a male from the Khasia Hills in the collection of the Rev. W. A. Hamilton. Swinhoe states that the type is in Calcutta but this was probably an assumption on his part as there is a male labelled " Khasia Hills, *Zephyrus khasia* de Nicéville ♂ type, ex coll. Elwes 1902–85 " in the B.M. (N.H.).

Tytler took a series of both sexes in the Naga Hills at Phesima, Kirbari and Jakama and at Suroifui in Manipur. His neallotype is from Jakama.

The male Up reflects violet to violet-bronze when wet.

DISTRIBUTION. Assam and Manipur.

GROUP 4

Neozephyrus ataxus Doubleday & Hewitson

(Fig. 45)

Dipsas ataxus Doubleday & Hewitson, 1852, *Gen. Diurn. Lep.* **2** : 480, pl. 74, fig. 7.
Dipsas katura Hewitson, 1865, *Ill. Diurn. Lep.* **1** (4) : 65, pl. 26, fig. 12 (♀).

Types in B.M. (N.H.).

This large and very distinct species is separated from others of this genus by the male having a plain silvery white gr. c. to the Un with only the brown discoidal bars and submarginal marks of both F and H contrasting sharply with it. The female on the Un differs considerably from the male in being predominantly brown with silvery fasciae between the postdiscal and submarginal bands of the F, and the H having a broad silvery median fascia.

The nominotypical race occurs in the Punjab, Murree Hills etc., the United Provinces, Mussoorie and Kumaon districts and Upper Burma and is distinguished by the male having the black border of the UpF broadening conspicuously towards the apex. The female belongs to the AB form.

The male Up reflects violet-bronze to reddish-bronze when wet.

DISTRIBUTION. Punjab to Upper Burma.

ssp. ***zulla*** Tytler

Zephyrus ataxus zulla Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 124.

Types in B.M. (N.H.).

Tytler described this subspecies from the Naga Hills. It has the black border of the male UpF much narrower and not widening at apex. Specimens from Szechwan, W. China are similar. It has been well figured in Seitz (*Macrolep. World* **1** : 271, pl. 74*a*) and by Leech in *Butterflies of China, Japan and Corea* **2** : 374, pl. 27, figs. 5, 6.

The female belongs to the AB form.

DISTRIBUTION. Naga Hills, Assam and W. China.

ssp. ***kirishimaensis*** Okajima

Zephyrus ataxus var. *kirishimaensis* Okajima, 1922, *Zool. Mag. Tokyo* **34** : 586.

This subspecies from Honshu, Shikoku and Kyushu in Japan differs a little from *zulla* in having the Un of the male more sparsely marked with brown, the discoidal bars in the one specimen in the B.M. (N.H.). being obsolete. The female belongs to the A form but the purple-blue is not so extensive as that in the mainland forms and does not reach the base of the F. According to Murayama & Sibatani it also has a female of the AB form.

DISTRIBUTION. Japan.

ssp. ***yakushimaensis*** Yazaki, 1924, *Zool. Mag.* **35** : 391, 417 (not seen)

Apparently a rather rare and local subspecies from Yakushima Is. near the southern tip of Kyushu, which seems only to differ from *kirishimaensis* in having the tails of the H much reduced or absent.

DISTRIBUTION. Yakushima Is., Japan.

GROUP 5

Genus ***AUSTROZEPHYRUS*** gen. nov.

Type of genus : *Dipsas absolon* Hewitson (1865).

The male genitalia are characterized by the complete lack of falces, the enormous development of the uncus, the well-developed tegumental ridge, the comparatively small valves and the aedeagus having the basal portion approximately a third of the total length. It may be mentioned here that only one other species of " *Zephyrus* " examined has the falces missing, this being *courvoisieri* Oberthür, which is placed temporarily in *Teratozephyrus*, the falces in that genus being simplified and very reduced. Externally the frons, eyes, palpi, antennae, legs and neuration are similar to those of *Neozephyrus*, but the males have the black apex of the UpF extending basad towards the cell and not including the costa, thus giving a notched appearance to the inner edge of the black apical marking. Both sexes have the Un suffused with purple and with the postdiscal line of UnH in the form of a " V ". The males as far as is known all reflect yellow gold on Up when wet.

The generic name was suggested by the distribution of the species, which are the most southerly representatives of " *Zephyrus* ", inhabiting Malaya, Java, Sumatra and Borneo, and thus actually extending into the southern hemisphere.

Austrozephyrus absolon Hewitson ***comb. nov.***

(Fig. 46)

Dipsas absolon Hewitson, 1865, *Illustrations Diurnal Lepidoptera* **1** (4) : 65, pl. 30, figs. 11, 12, ♂.
Zephyrus absolon Hewitson (de Nicéville) 1895, *J. Bombay nat. Hist. Soc.* **9** : 291–3.

Holotype male in B.M. (N.H.).

There are two distinct forms of this butterfly, the first with a violet-brown postdiscal area on the Un of both F and H (form 1), the other with a well-developed white postdiscal band (form 2). There has been some confusion over these two forms in the past. Originally Hewitson described and figured this species from a male labelled " Indies or." belonging to form 1. In 1895 de Nicéville commented on the two forms and redescribed the male of form 1 from Mt. Gede, 4,000 ft., W. Java, adding a description of the female of form 2 from Sukabumi, 2,000 ft. W. Java.

Later on in the same paper he mentions that he has another female from the same locality as the male that belonged to the same form i.e. form 1. Seitz (*Macrolep. World* **9** : 968, pl. 155*a*) apparently took Fruhstorfer's specimen (form 2) from "Soekaboemi (Sukabumi) 2,000 ft." as being typical, disregarding Hewitson's figure and description and described it as being "recognizable by the broad white postdiscal band". Fruhstorfer's male specimen was labelled "Type" in his collection, now in the B.M. (N.H.), but had no name attached to it. Toxopeus (1935, *Ent. Med. Ned.-Indie.* **1** (2) : 33–36) summarizes the literature but confuses the issue still further by naming the female of form 1 *acosmeta*. Why de Nicéville wrongly associated the two forms will have to remain a mystery for there is no doubt the typical form (form 1) with no white postdiscal bands on Un must be that which agrees with Hewitson's holotype male. Therefore *acosmeta* is a synonym of the typical form and since it leaves the white banded form in both sexes (form 2) without a name, which it well deserves, I propose the name ***albifasciatus*** forma n. for it.

HOLOTYPE MALE. Java occident, Sukabumi, 2,000 ft., 1893, Fruhstorfer coll., B.M. 1933–131, B.M. Type No. Rh. 16064, in B.M. (N.H.).

ALLOTYPE FEMALE. Java. W. H. Evans coll. B.M. 1932–274, B.M. Type No. Rh. 16065, in B.M. (N.H.).

The series in the B.M. (N.H.) consists of three males and four females including Hewitson's type and the types of *albifasciatus*.

The male Up reflects a deep gold when wet.

DISTRIBUTION. Java.

ssp. ***thamar*** Toxopeus

Ruralis absolon thamar Toxopeus, 1935, *Ent. Med. Ned-Indie.* **1** (2) : 35.

This subspecies is the Sumatran race and may be separated from the typical *absolon* from Java by the UnF having the orange spot larger and extending upwards as far as the top of the cell bar, and by the female having the orange spots of the UnF more than twice as large as the Javan specimens.

The B.M. (N.H.) has one male from Mt. Kaba, 1,600 m. (Hagen).

DISTRIBUTION. Sumatra. Toxopeus records it from Mt. Tanggamoes, S. Sumatra, nearly 7,000 ft.

ssp. ***malayicus*** Pendlebury

(Fig. 92, 101)

Thecla malayica Pendlebury, 1939, *J.F.M.S. Mus.* **18** : 391.

Holotype female in B.M. (N.H.).

The male is unknown and until it has been examined the exact relationship of the Malayan specimens will have to remain in doubt. Pendlebury originally described it as a distinct species together with *borneanus* but Corbet (1941, *J.F.M.S. Mus.* **18** : 812) stated that almost certainly they were both subspecies of *absolon*. However on examination *borneanus* has proved to be a separate species so that when the male has been examined *malayicus* itself may be found to be a separate species or may even be related to *borneanus*. Since however the Un more closely resembles that of *absolon* it seems as well to leave it as a subspecies of this in accordance with Corbet.

DISTRIBUTION. Malaya. The type comes from Pahang, Cameron Highlands.

Austrozephyrus borneanus Pendlebury ***comb. nov.***

(Figs. 47, 93, 102)

Thecla borneana Pendlebury, 1939, *J.F.M.S. Mus.* **18** : 392.

Only the unique male known. Described by Pendlebury as a distinct species, it was erroneously thought by Corbet to be the Bornean subspecies of *absolon*. The type male in B.M. (N.H.) is labelled " B.N. Borneo, Mt. Kinabalu, Marei Parei, 5,000 ft., 30.iv.1929, H. M. Pendlebury, B.M. 1940–158, B.M. Type No. Rh. 16066, Gen. No. T.G.H. 1955–133".

It reflects a deep gold on Up when wet.

DISTRIBUTION. Borneo.

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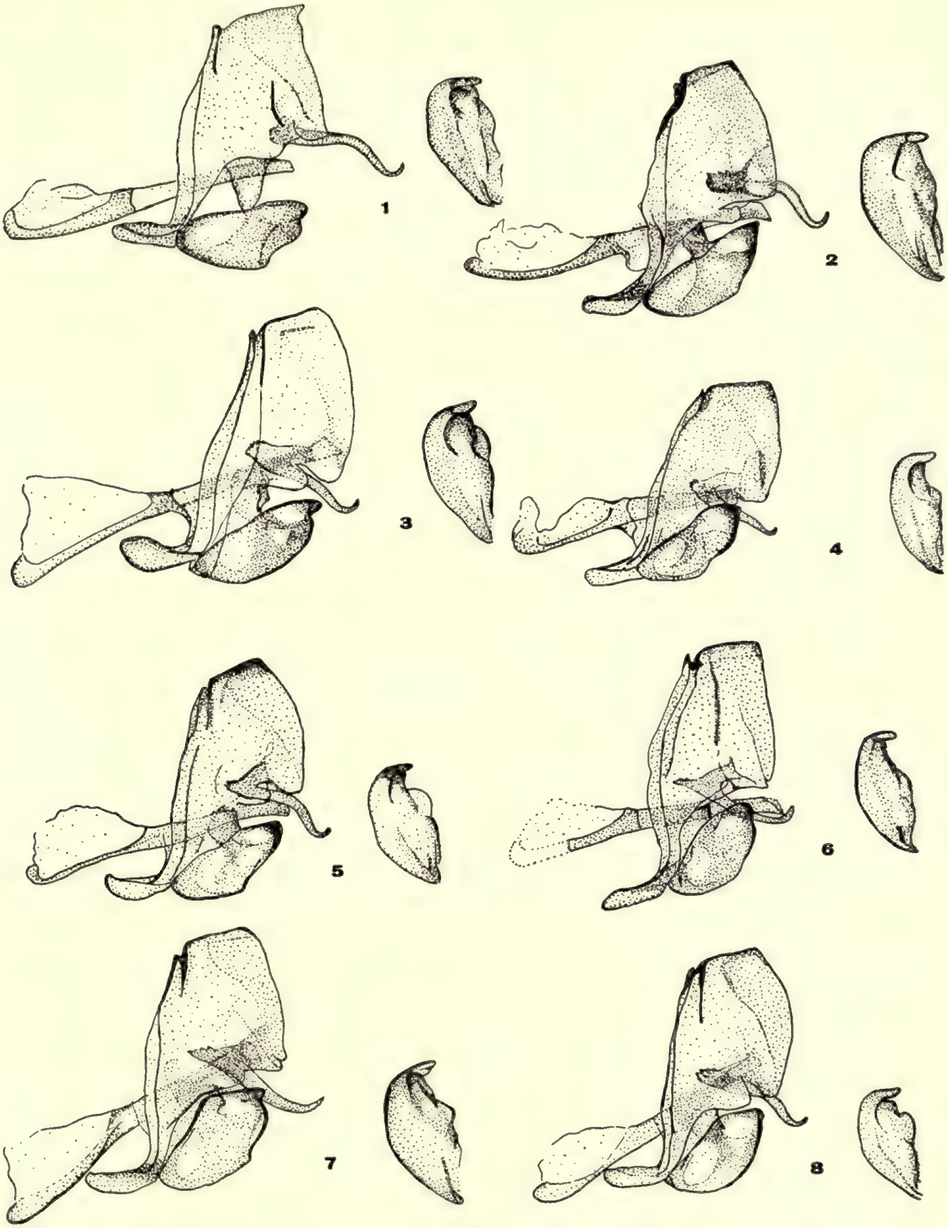
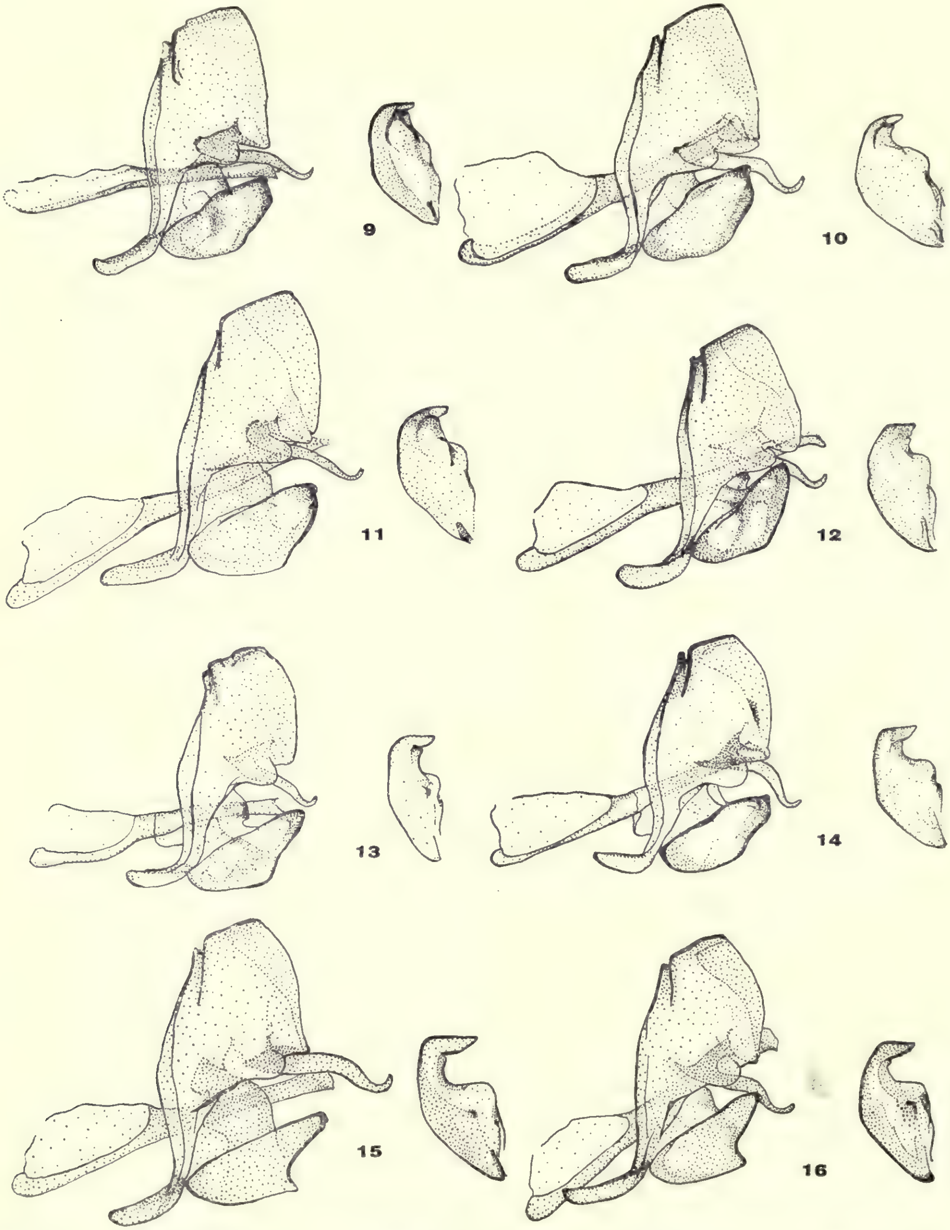
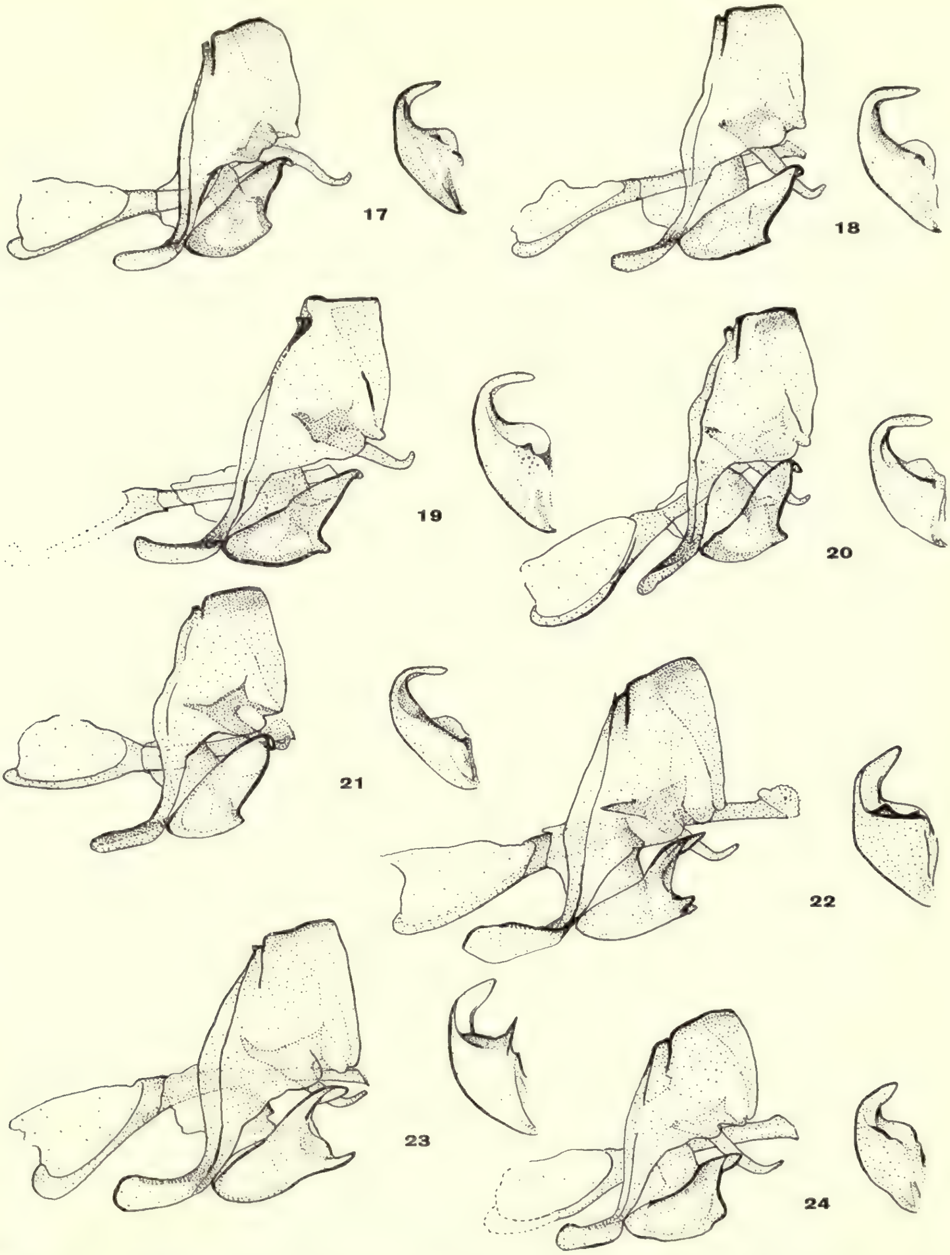


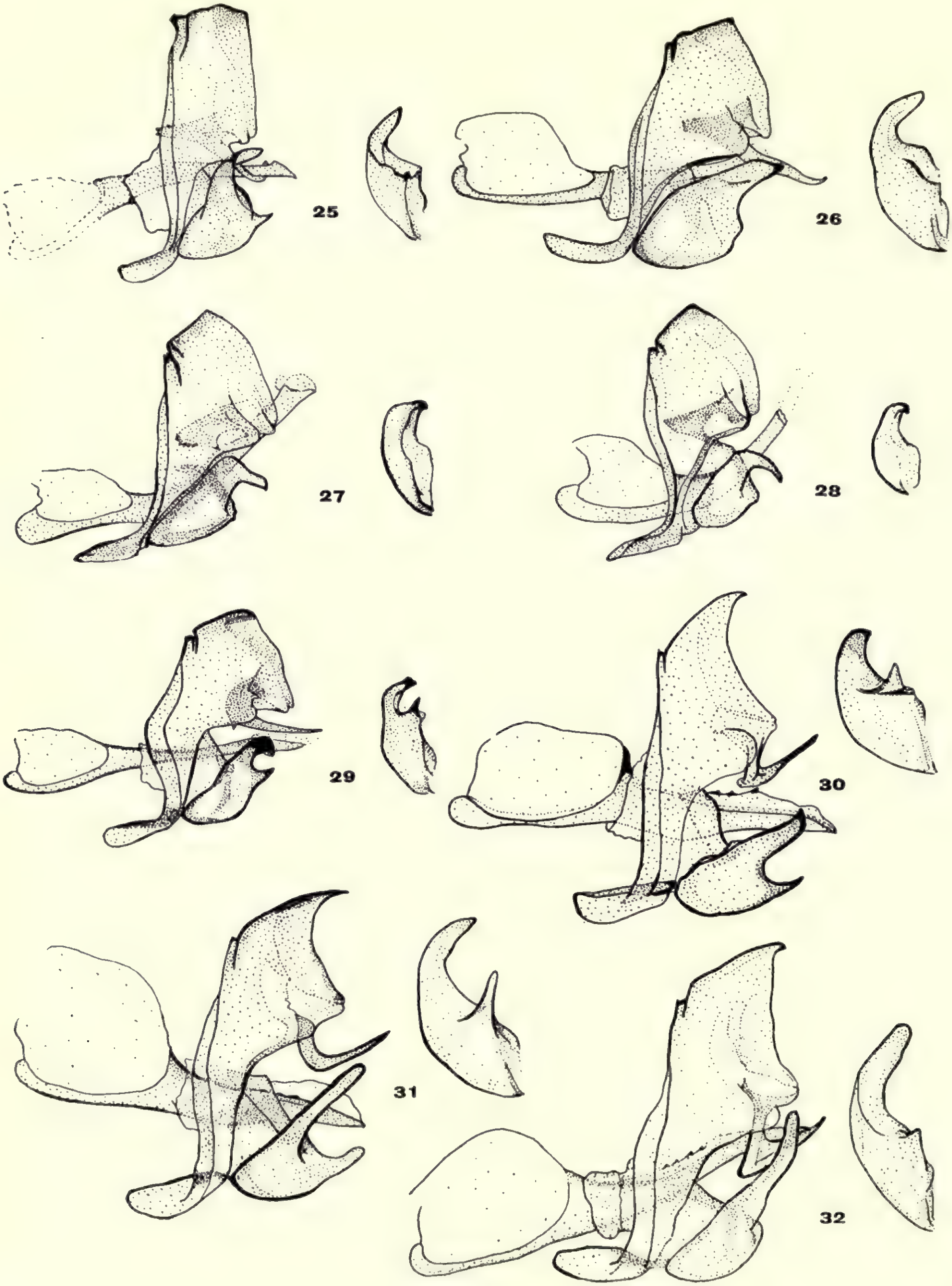
FIGS. 1–8. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (1) *aurorinus* Oberthür, (2) *sikkimensis* sp. n. (type), (3) *nigroapicalis* sp. n. (type), (4) *kabrua* Tytler, (5) *kabrua niitakanus* Kano, (6) *scintillans* Leech (type), (7) *watsoni* Evans (type), (8) *teisoi* Sonan.



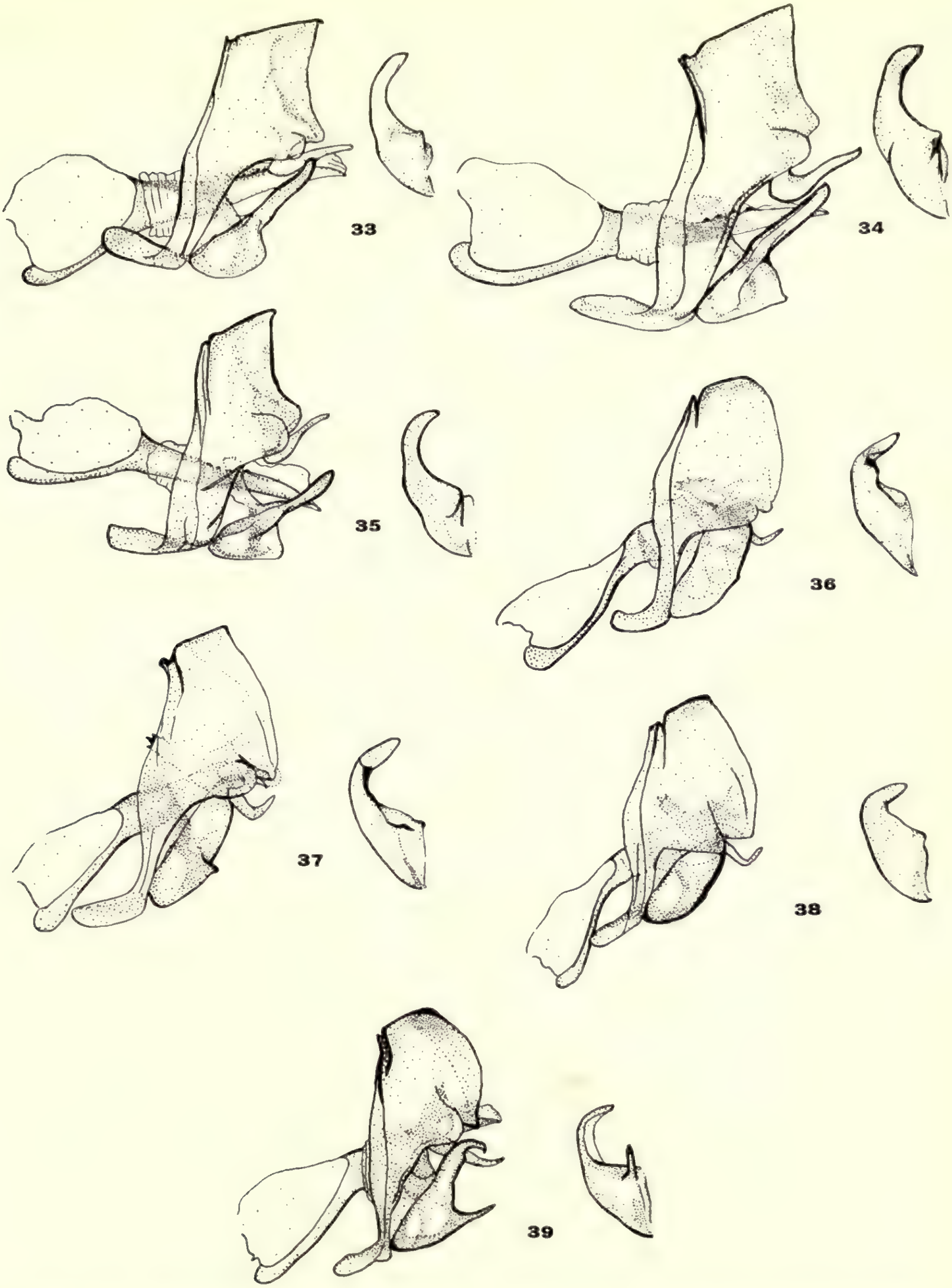
Figs. 9–16. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (9) *vittatus* Tytler, (10) *marginatus* sp. n. (type), (11) *zoa* de Nicéville, (12) *tytleri* sp. n., (13) *sandersi* sp. n. (type, (14) *intermedius* Tytler, (15) *desgodinsi* Oberthür, (16) *desgodinsi dumoides* Tytler.



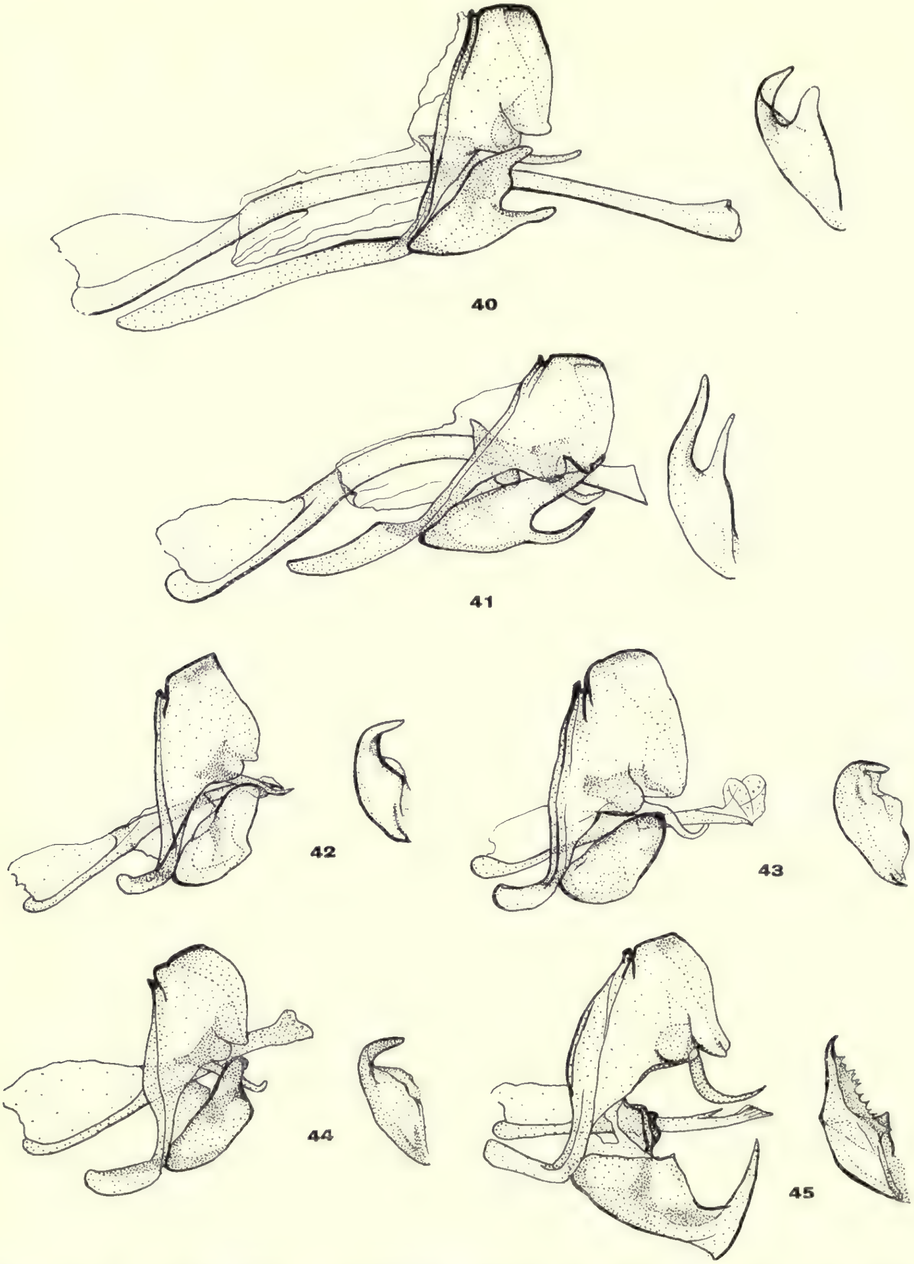
FIGS. 17–24. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva : (17) *duma* Hewitson, (18) *tatsienluensis* Murayama (type), (19) *yunnanensis* sp. n. (type), (20) *smaragdinus sikongensis* Murayama, (21) *smaragdinus* Oberthür, (22) *tienmushanus* Shirôzu & Yamamoto (23) *chinensis* sp.n. (type), (24) *souleana* Riley.



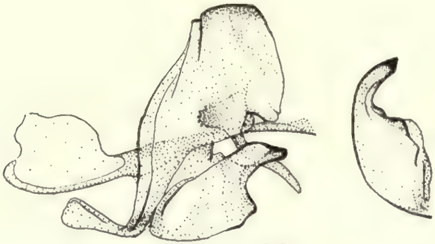
FIGS. 25–32. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva : (25) *souleana* ssp. ?, (26) *disparatus* sp. n., (27) *mushaellus rileyi* Forster (type), (28) *mushaellus* Matsumura, (29) *hisamatsusanus* Nagami & Ishiga, (30) *suroia* Tytler, (31) *dubernardi* Riley (type), (32) *coruscans* Leech.



Figs. 33–39. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (33) *helenae* sp. n., (34) *taiwanus* Wileman, (35) *taxila* Bremer, (36) *birupa* Moore, (37) *bhutanensis* sp. n. (type), (38) *triloka* Hannyngton (neallotype), (39) *jakamensis* Tytler.



FIGS. 40–45. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (40) *syla* Kollar, (41) *assamicus* Tytler, (42) *kirbariensis* Tytler, (43) *paona* Tytler (type), (44) *khasia* de Nicéville, (45) *ataxus* Hewitson.



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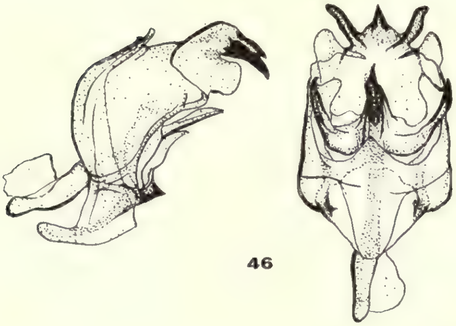

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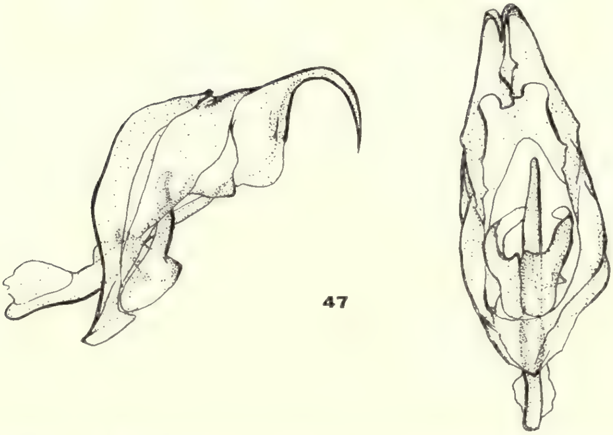

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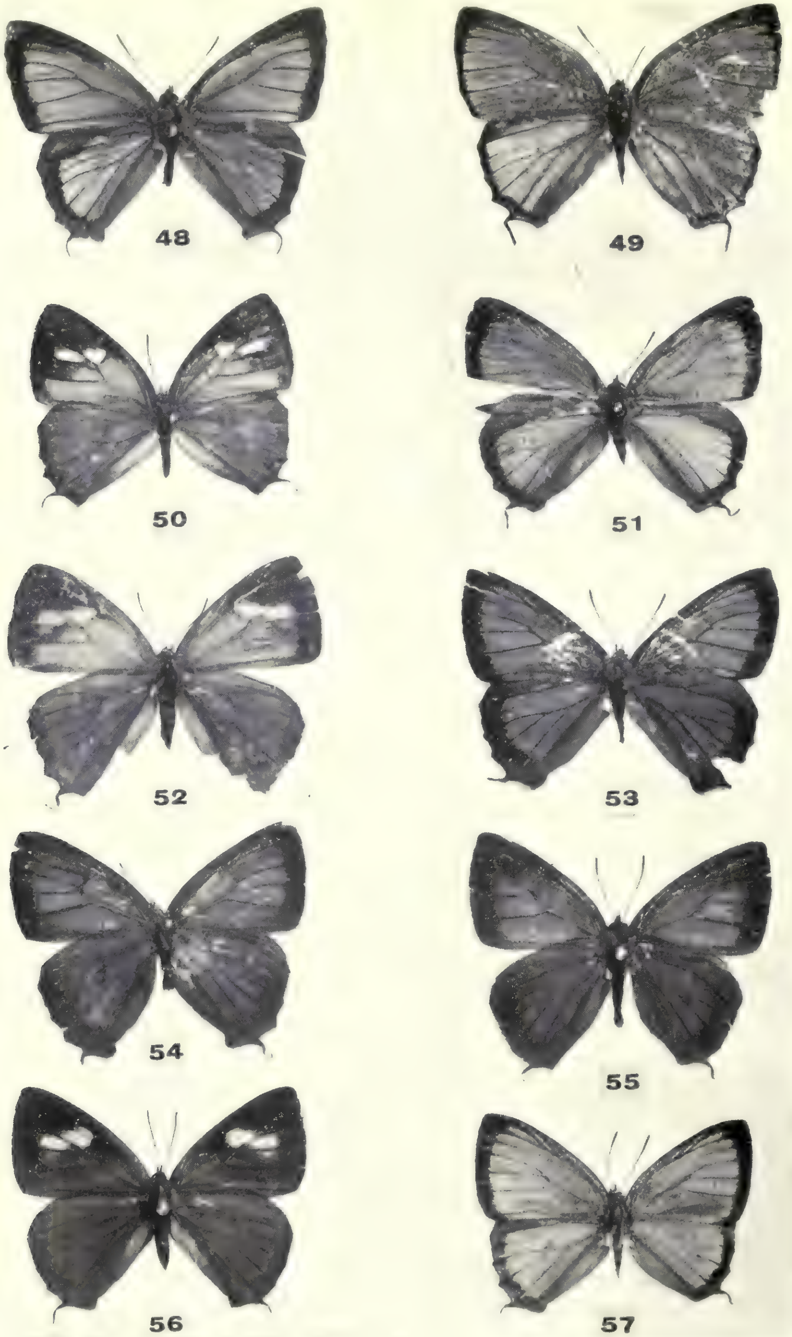
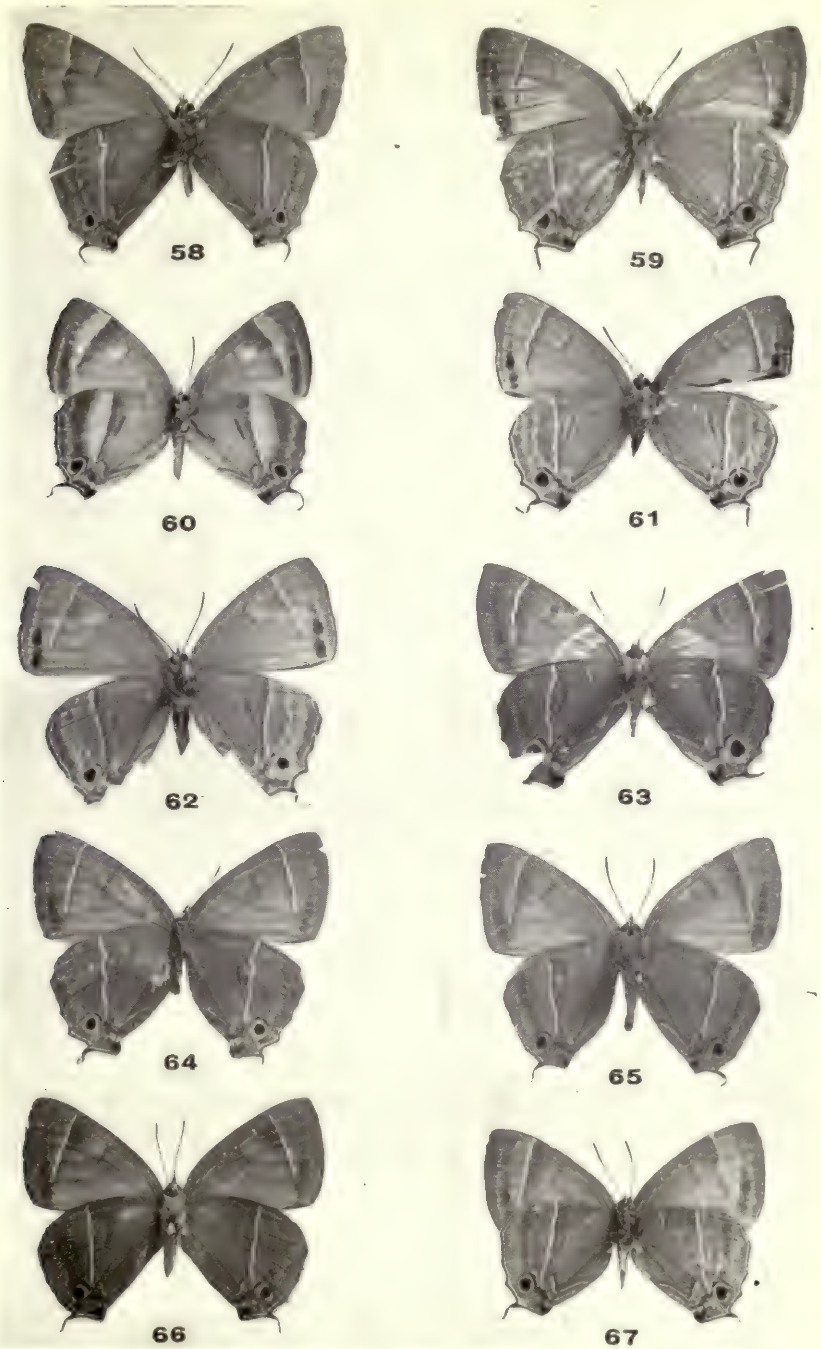
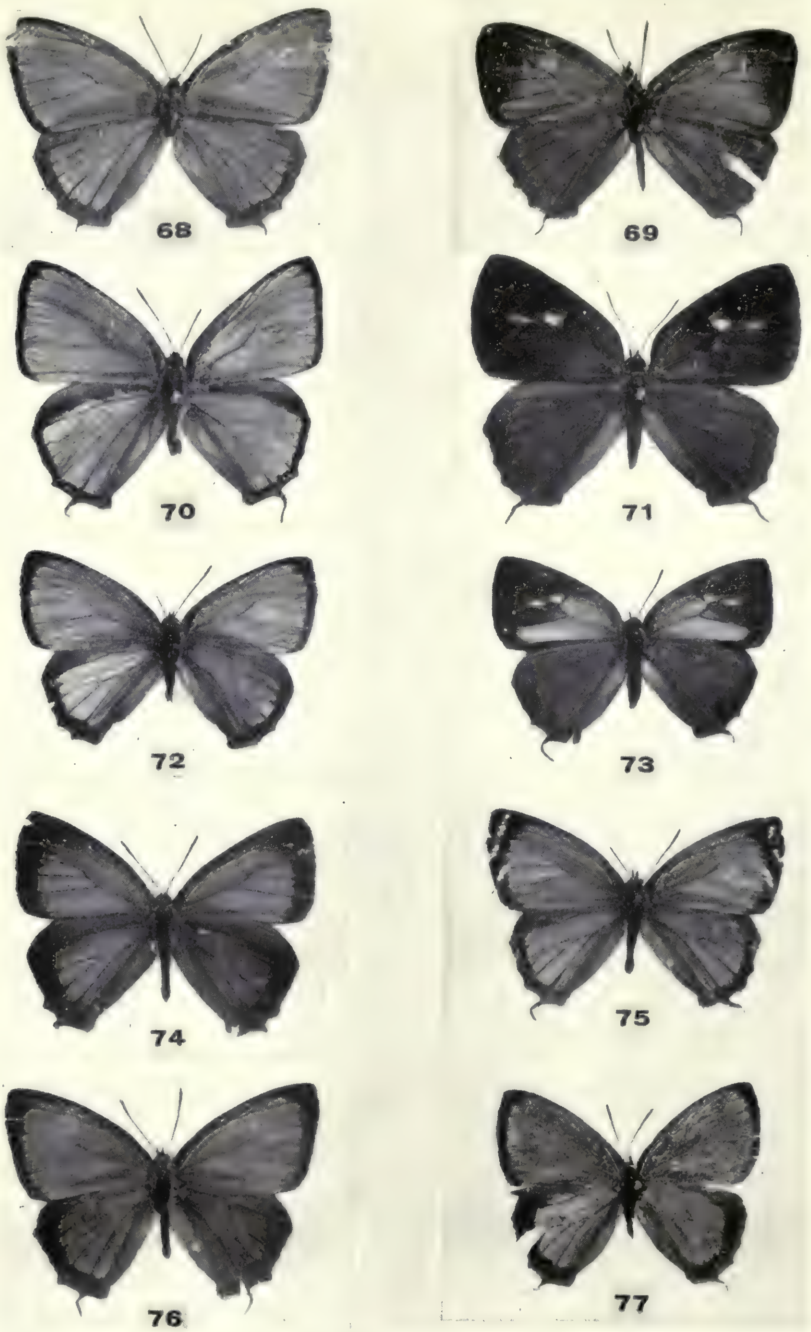
Figs. 45*a*–47. (45*a*) Male genitalia of *Neozephyrus rarasanus* Matsumura showing the lateral aspect and the ventral aspect of the right valva. Male genitalia of *Austrozephyrus* gen. n. showing the lateral and ventral aspects. (46) *absolon* Hewitson, (47) *borneanus* Pendlebury (type).



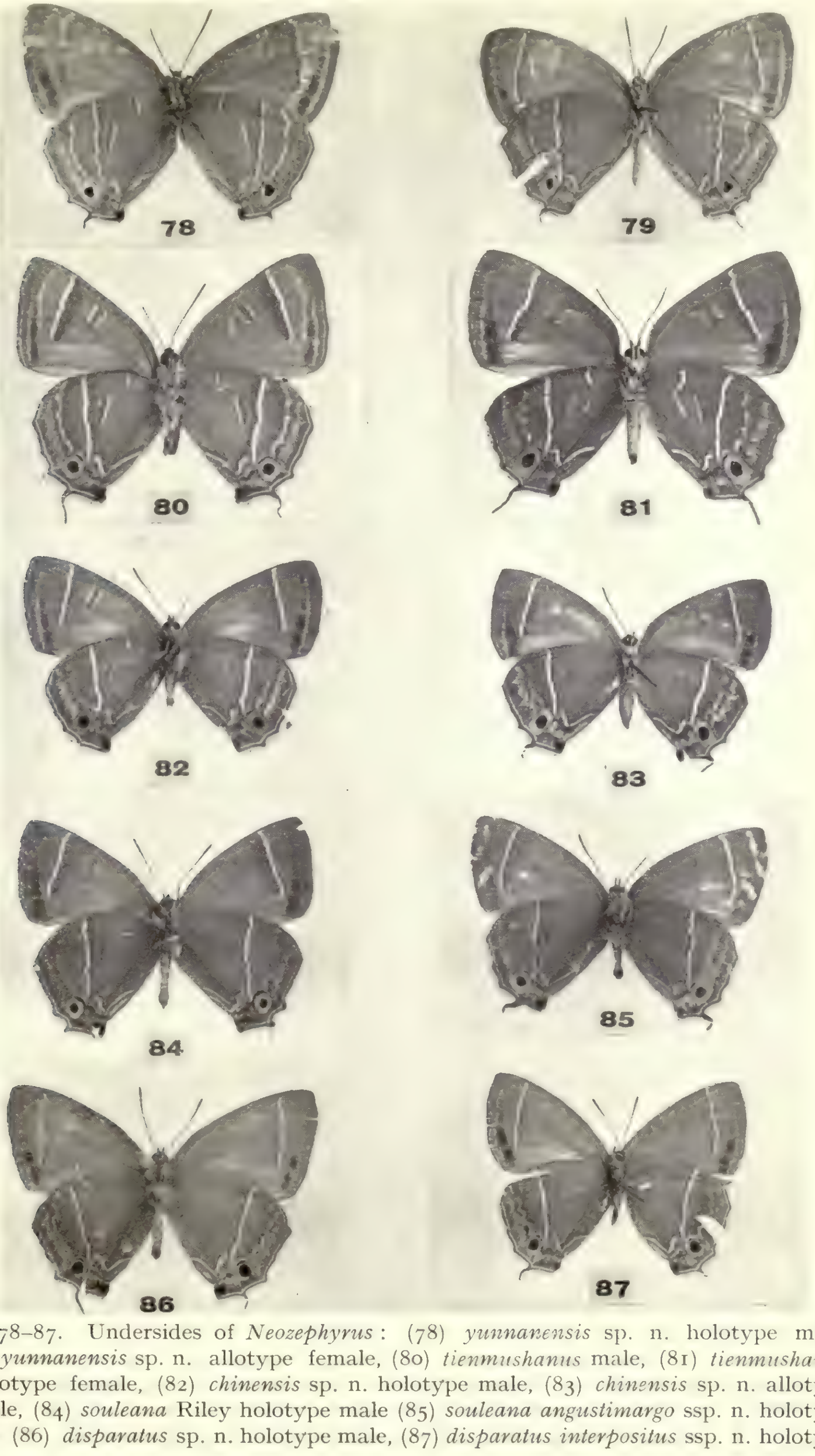
FIGS 48–57. Uppersides of *Neozephyrus*: (48) *sikkimensis* sp. n. holotype male, (49) *nigroapicalis* sp. n. holotype male, (50) *kabrua* Tytler neallotype female, (51) *watsoni* Evans holotype male, (52) *watsoni* Evans allotype female, (53) *marginatus* sp. n. holotype male, (54) *zoa* de Nicéville male, (55) *tytleri* sp. n. holotype male, (56) *tytleri* sp. n. allotype female, (57) *sandersi* sp. n. holotype male.



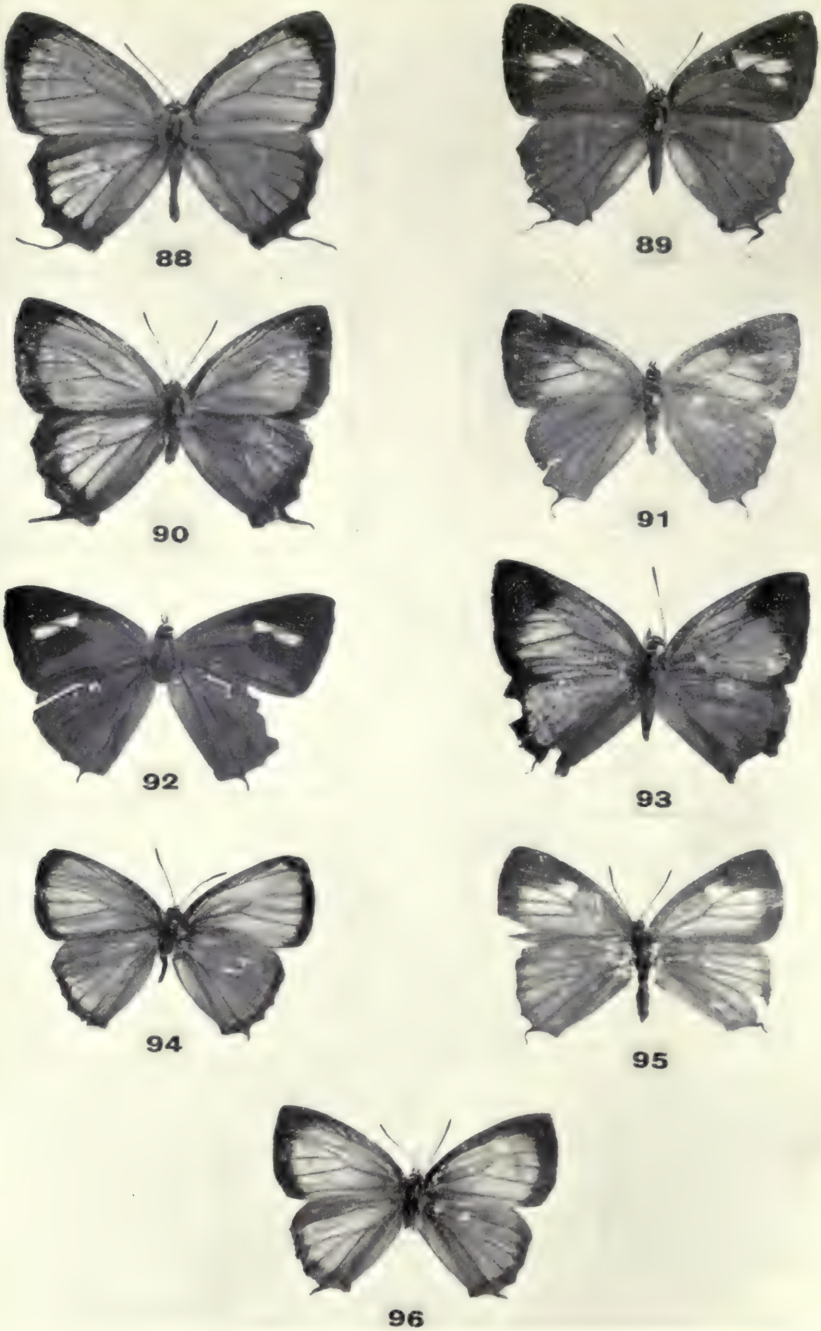
FIGS. 58–67. Undersides of *Neozephyrus*: (58) *sikkimensis* sp. n. holotype male, (59) *nigroapicalis* sp. n. holotype male, (60) *kabrua* Tytler neallotype female, (61) *watsoni* Evans holotype male, (62) *watsoni* Evans allotype female, (63) *marginatus* sp. n. holotype male, (64) *zoa* de Nicéville male (65) *tytleri* sp. n. holotype male, (66) *tytleri* sp. n. allotype female, (67) *sandersi* sp. n. holotype male.



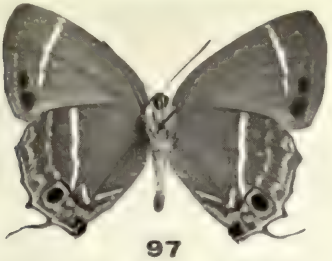
FIGS. 68–77. Uppersides of *Neozephyrus*: (68) *yunnanensis* sp. n. holotype male, (69) *yunnanensis* sp. n. allotype female, (70) *tienmushanus* male, (71) *tienmushanus* neallotype female, (72) *chinensis* sp. n. holotype male (73) *chinensis* sp. n. allotype female, (74) *souleana* Riley holotype male, (75) *souleana angustimargo* ssp. n. holotype male, (76) *disparatus* sp. n. holotype male, (77) *disparatus interpositus* ssp. n. holotype male.



FIGS. 78–87. Undersides of *Neozephyrus* : (78) *yunnanensis* sp. n. holotype male, (79) *yunnanensis* sp. n. allotype female, (80) *tienmushanus* male, (81) *tienmushanus* neallotype female, (82) *chinensis* sp. n. holotype male, (83) *chinensis* sp. n. allotype female, (84) *souleana* Riley holotype male (85) *souleana angustimargo* ssp. n. holotype male (86) *disparatus* sp. n. holotype male, (87) *disparatus interpositus* ssp. n. holotype male.



FIGS. 88–96. Uppersides of *Neozephyrus* and *Austrozephyrus*: (88) *N. helenae* sp. n. holotype male, (89) *N. helenae* sp. n. allotype female, (90) *N. dubernardi* Riley holotype male, (91) *N. taiwanus* Wileman holotype female, (92) *A. absolon malayicus* Pendlebury holotype female, (93) *A. borneanus* Pendlebury holotype male, (94) *N. triloka* Hannyngton, neallotype male, (95) *N. triloka* Hannyngton holotype female. (96) *N. bhutanensis* sp. n. holotype male,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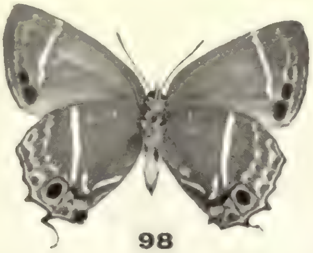
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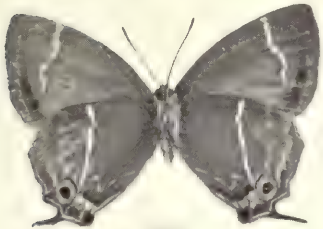
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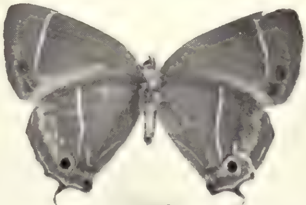
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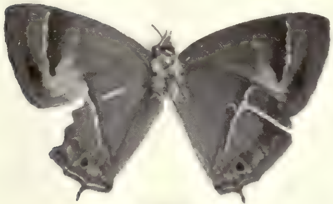
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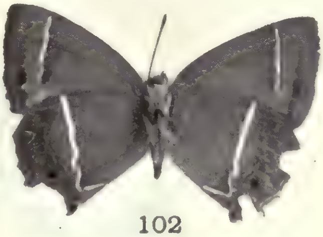
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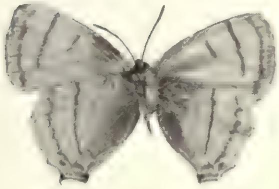
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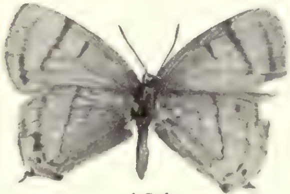
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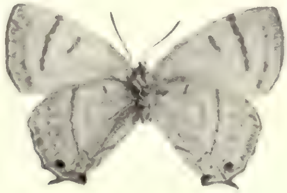
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FIGS. 97–105. Undersides of *Neozephyrus* and *Austrozephyrus*: (97) *N. helenae* sp. n. holotype male, (98) *N. helenae* sp. n. allotype female, (99) *N. dubernardi* Riley holotype male, (100) *N. taiwanus* Wileman holotype female, (101) *A. absolon malayicus* Pendlebury holotype female, (102) *A. borneanus* Pendlebury holotype male, (103) *N. triloka* Hannyngton neallotype male, (104) *N. triloka* Hannyngton holotype female, (105) *N. bhutanensis* sp. n. holotype male.

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NEUROPTERA AND TRICHOPTERA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 7
LONDON: 1957

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Pp. 287–308 ; *Text-figures* 1–16

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NEUROPTERA AND TRICHOPTERA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

By D. E. Kimmins

During the period of the British Museum Expedition to Rennell Island Mr. J. D. Bradley also made collections on Guadalcanal Island. The Neuroptera only amounted to fourteen examples, two species of Myrmeleonidae and one of Chrysopidae, none being endemic.

The Trichoptera of the Solomon Islands as a whole appear to be almost completely unknown and I have only been able to trace one species described from Solomon Island material (*Anisocentropus solomonis* Banks). One other species, *Notanatolica magna* (Walker) was taken on Rennell Island by both the Danish and British Expeditions. This apparent scarceness can only be due to lack of collecting since during the periods that Mr. Bradley worked on Guadalcanal Island, he took no fewer than fourteen species, all but two of which are described as new in this paper. Of the other two, one may be *Anisocentropus solomonis* Banks and the other is a species of *Nyctiophylax* represented by a single female.

The types of all new species are in the British Museum (Natural History).

NEUROPTERA

Family MYRMELEONIDAE

Distoleon lentus (Walker)

Honiara, 10–14.ix., 3, 5–9.x.1953, 2 ♂, 7 ♀.

Tapenanje, 10–23.xii.1953, 1 ♀.

Distribution. Ceylon, India, Burma, Malaya, Hainan, Java, New Guinea, Queensland, New Hebrides, New Britain, Solomon Islands, Fiji.

Myrmeleon celebensis McLachlan

Honiara, 5–14.x.1953, 5–11.i.1954, 2 ♀, 1 ?.

Distribution. Celebes, Malaya, Sumatra, New Guinea, Aru Islands, New Hebrides.

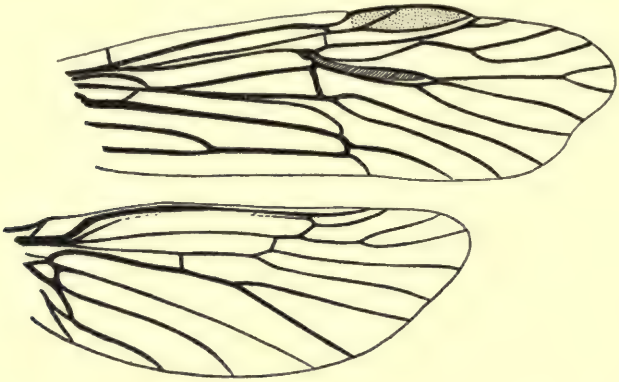

FIG. 1. *Apsilochorema rossi* sp. n. ♂ wings.

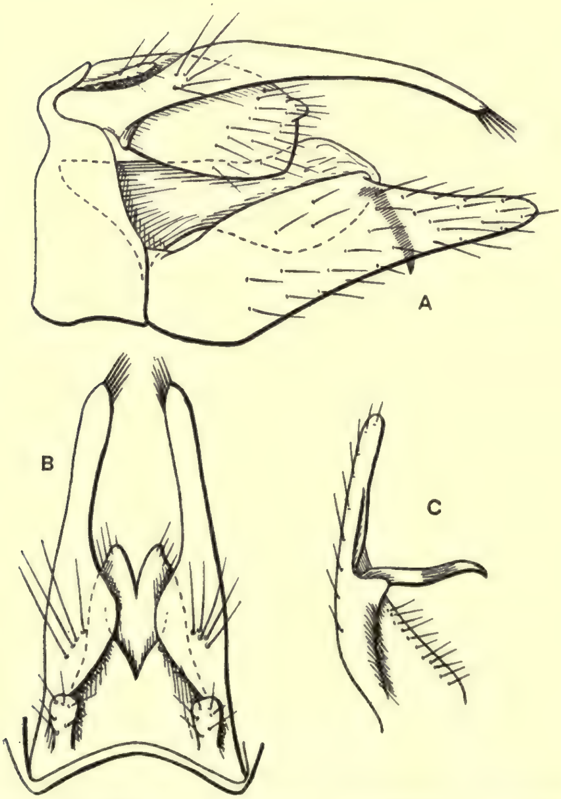

FIG. 2. *Apsilochorema rossi* sp. n. ♂ genitalia. (A), lateral ; (B), tenth segment, dorsal ; (C), right clasper, dorsal.

Family CHRYSOPIDAE

Italochrysa chloromelas (Girard)

Honiara, 4–11.i.1954, 1 ♀.
DISTRIBUTION. New Hebrides, New Caledonia, Lifu, Solomon Islands.

TRICHOPTERA

Family RHYACOPHILIDAE

Apsilochorema rossi sp. n. (Figs. 1, 2)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour varying shades of fuscous. Fore wing with R_{2+3} forming a small fork at apex. Cell M_1 very short. Wing-fold or pouch about as long as pterostigma, slender.

♂ GENITALIA. A strong process to seventh sternite. Ninth segment reduced dorsally to a narrow, transverse band. Tenth segment forming a short, transparent hood, quadrate from the side, excised apically from above. At its base on each side is a short, flattened cercus and a long, arched spine, which is dilated inwardly in the basal half and armed apically with a tuft of spines. Aedeagus short, stout, semi-membranous. Clasper long, moderately broad in basal half, then tapering to a rounded, finger-like apex. From the inner surface arises a slender, sinuous, inwardly directed spine, its basal attachment flexible.

Length of fore wing, 4·5 mm.

♂ type mounted as microscope preparations. This species is closely related to the Fijian *A. banksi* (Mosely). It differs in the fore wing in having R_2 and R_3 separated apically, a shorter cell M_1 and a longer fold in the centre of the wing. In the genitalia, the lateral processes of the tenth segment are longer and stouter, the segment is excised apically and the aedeagus stouter.

Synagapetus salomonis sp. n. (Fig. 3)

Tapenanje, 10–15.xii.1953, 2 ♂.

General colour medium fuscous, venation typical of *Synagapetus*, discoidal cell in fore wing short, about one and a half times as long as broad. In hind wing, R_2 and R_3 are fused throughout.

♂ GENITALIA. Sixth sternite with a long, slender, ventral process, arising from a large, conical base and projecting almost at right angles to the sternite. Ninth segment narrowed dorsally. Tenth segment forming a large and deep hood, obliquely and shallowly concavo-truncate apically in side view, apices slightly hooked inwards. Cercus short and truncate. Aedeagus stout, with a pair of stout, curved spines on its upper surface, apex clavate in side view, excised in dorsal view. Clasper rather slender, nearly as long as tenth segment, obliquely truncate apically.

Length of fore wing, 3·25 mm.

♂ type mounted as microscope preparations, ♂ paratype in 2% formaldehyde solution. This species is perhaps nearest to *S. crala* Mosely but differs in the more quadrate cerci, narrower claspers and differently formed aedeagus. Two females from Honiara, 9–10.x.1953, may possibly belong to this species.

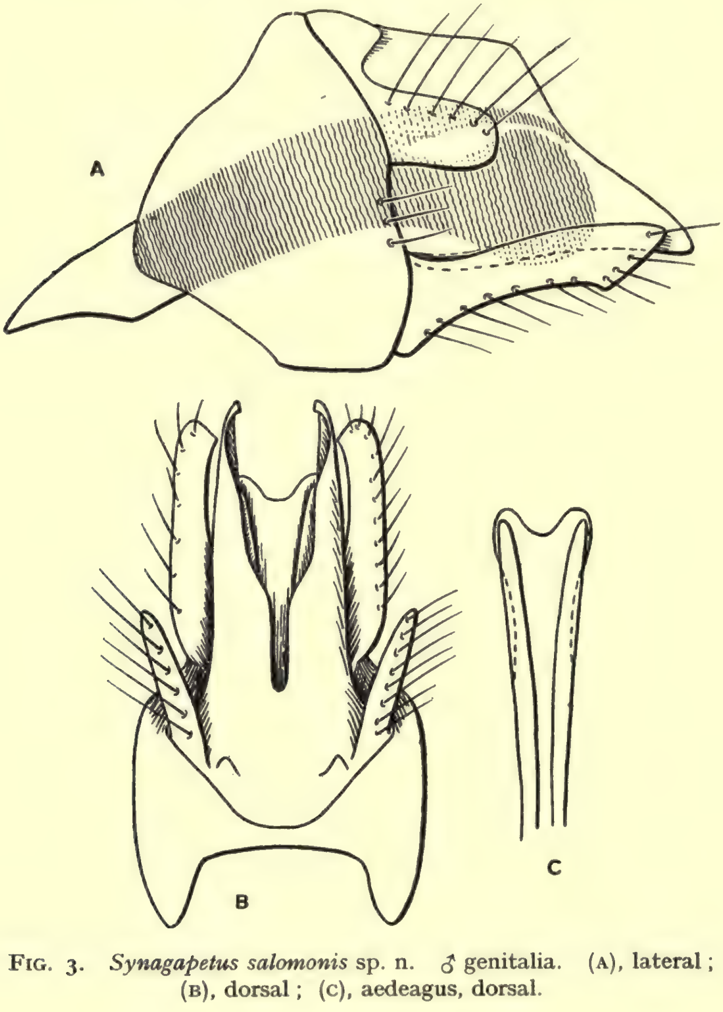

FIG. 3. *Synagapetus salomonis* sp. n. ♂ genitalia. (A), lateral; (B), dorsal; (C), aedeagus, dorsal.

Family PHILOPOTAMIDAE

Chimarra biramosa sp. n. (Figs. 4A, 5)

Tapenanje, 10–15.xii.1953, 2 ♂, 6 ♀.

Head castaneous, warts light ochraceous, antennae (incomplete) greyish ochraceous, palpi fuscous. Thorax castaneous above, with the pronotal and mesoscutellar warts ochraceous, sides lighter ochraceous. Abdomen pale fuscous, pleurae ochraceous, genital segment and genitalia piceous. Wings (denuded) fuscous, venation as in Fig. 4A.

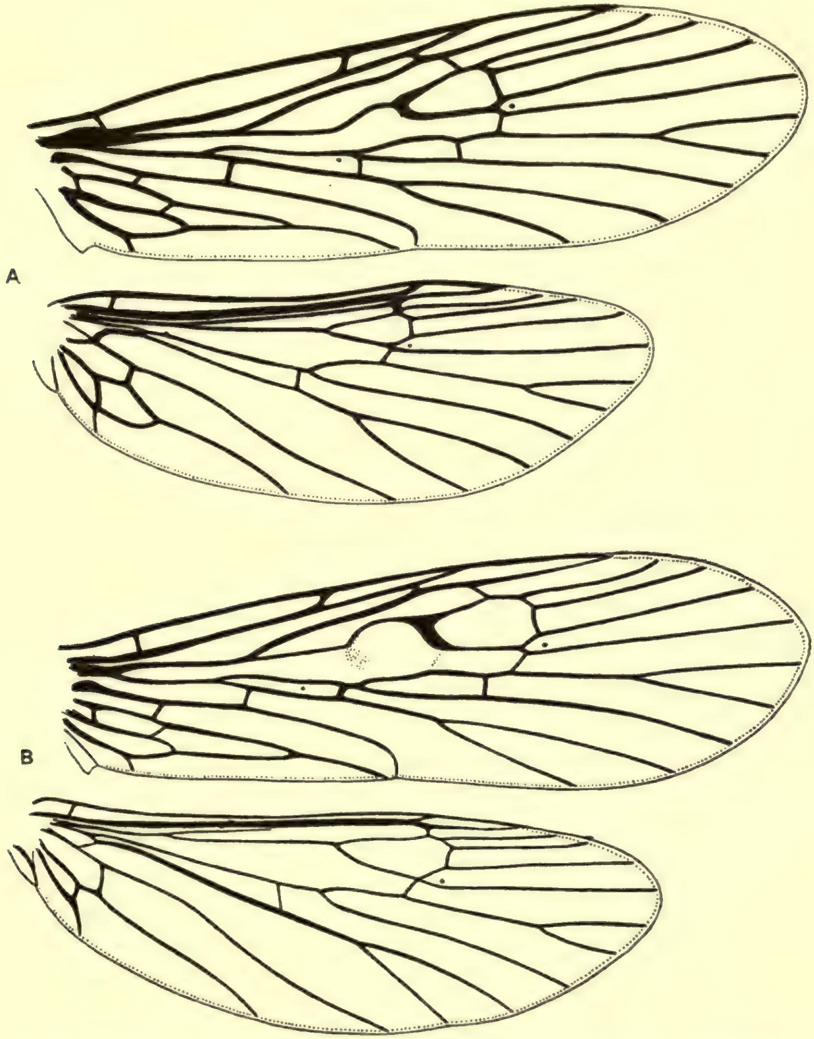

FIG. 4. *Chimarra* spp. n. ♂ wings. (A), *C. biramosa*; (B), *C. aureofusca*.

♂ GENITALIA. Eighth tergite with the centre of its apical margin excised. Ninth segment narrowed above and with a narrow, keel-like ventral process. Tenth segment long, hood-like, the sides strongly sclerotized and forming tapering, blunt blades, curving down on each side of the aedeagus. Central part of tenth segment membranous. Cercus short and rounded. Aedeagus with a membranous apex and enclosing a short, blackened spine. Clasper in side view terminating in two widely separated branches, the lower the narrower. From above, this lower branch is seen to be a broad lobe with a small, hooked apex. At its base on the upper surface a small, plate-like projection or branch can be seen in a cleared example.

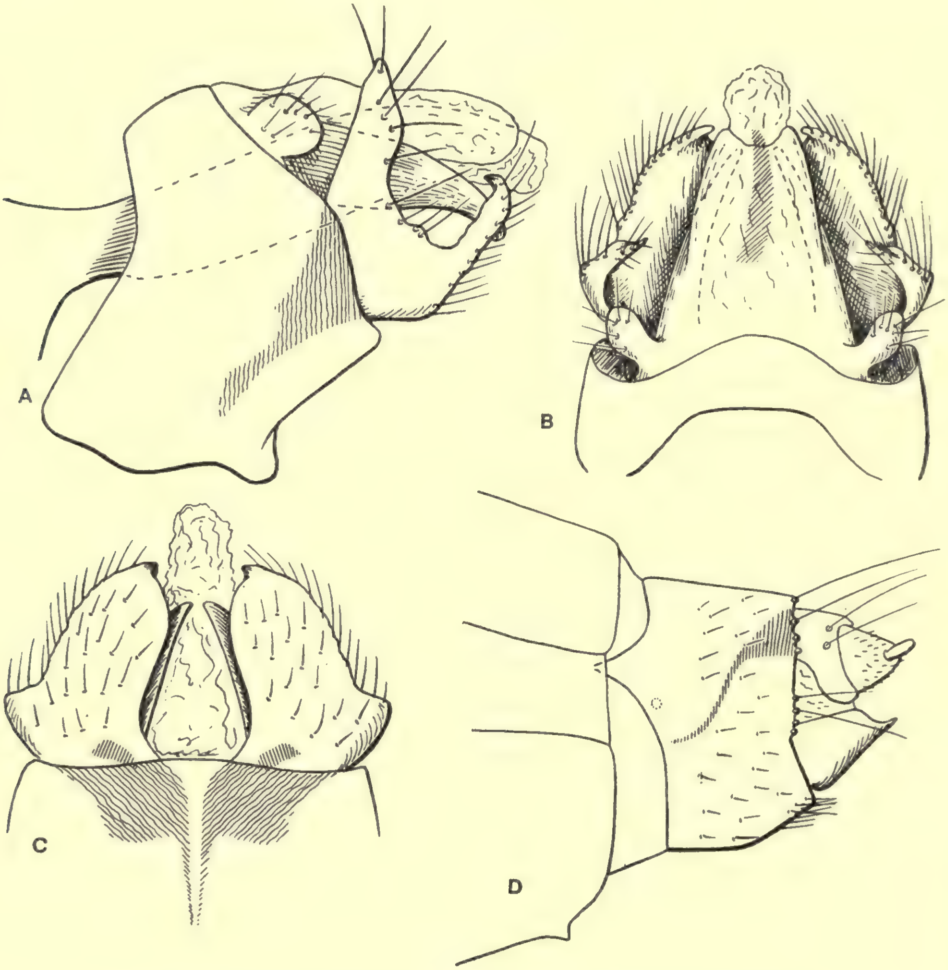

FIG. 5. *Chimarra biramosa* sp. n. Genitalia. (A), ♂, lateral; (B), ♂, dorsal; (C), ♂, ventral; (D), ♀, lateral.

♀ GENITALIA. Seventh sternite with a small ventral process. Eighth segment annular, apical margins fringed laterally with long setae. Ninth tergite arched, with long, sinuous, basal apodemes, sternite with two triangular sclerites, their inner margins touching. Tenth segment with a pair of short, single-segmented cerci.

Length of fore wing, 4·5 mm.

♂ type, ♀ allotype (with ♂ wings, ♂ and ♀ abdomens mounted as microscope preparations), and paratypes in 2% formaldehyde solution. This species differs from all the Australasian species known to me in the widely bifid claspers of the male.

Chimarra sp.

Tapenanje, 10–15.xii.1953, 2 ♀.

These specimens are paler than the females of *C. biramosa* sp. n., they show some differences in venation and in genitalia, but in the absence of males I do not propose to give them a name.

Chimarra aureofusca sp. n. (Figs. 4B, 6)

Honiara, 4–8.x.1953, 1 ♂, 1 ♀.

General colour golden brown. Head densely clothed with short, fuscous pubescence, warts not conspicuously paler, antennae and palpi pale fuscous. Thorax

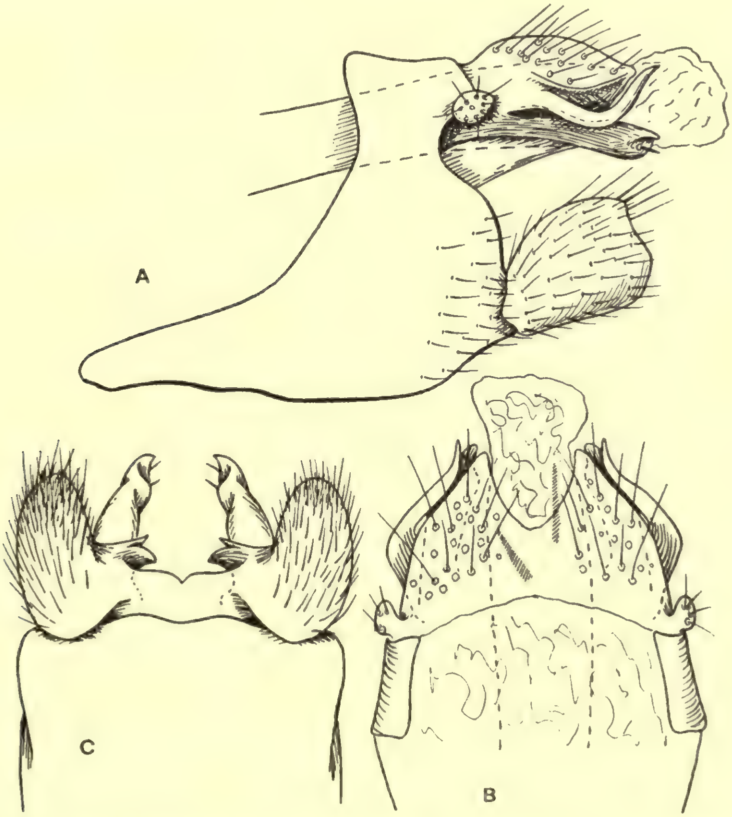

FIG. 6. *Chimarra aureofusca* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), claspers and aedeagus, ventral.

fuscous above, mesoscutellar warts concolorous. Legs pale fuscous, spurs fuscous. Abdomen golden brown, pleurae paler. Wings pale yellowish brown, with traces of fuscous pubescence, venation and margins fuscous. *Rs* in fore wing strongly sinuous, discoidal cell subquadrate. Thyridial and median cells of about equal length. In the hind wing, *Rs* is obsolete or fused with *Sc* about mid-way. 2*A* running into and fusing with 3*A*, not joining 1*A* to form a closed cell as in *C. biramosa.*

♂ GENITALIA. Ninth tergite membranous above, ventral surface much produced basally. Tenth segment flattened, plate-like, excised at the centre of its apical margin to form two triangular lobes, densely covered with long setae. From its lower, lateral margins near the base arise on each side two spines, the upper slender, sinuous and acute, the lower stout, straight, its inner margin corrugated. Cercus short, rounded, set laterally near the base. Aedeagus long, apex membranous and enclosing two short, black spines. Claspers short, stout, from the side truncate apically. From beneath they are ovate, their inner margins fused in a transverse plate and produced in bifid processes, upper acute, lower rounded.

♀. Similar to male in general appearance. GENITALIA. Eighth, ninth and tenth segments produced to form a narrow ovipositor, terminating in a pair of single-segmented cerci.

Length of fore wing, 4·25 mm.

♂ type, ♀ allotype in 2% formaldehyde solution, ♂ with one pair of wings and genitalia, ♀ with genitalia, mounted on microscope slides. This species does not appear to have any close relationship with any of the Australasian species known to me. The venation of the fore wing resembles that of *C. thienemanni* Ulmer in the strongly sinuate *Rs* and subquadrate discoidal cell, but in the hind wing the discoidal cell is larger and there is no closed anal cell between 1*A* and 2*A* The genitalia differ widely in pattern.

Family POLYCENTROPODIDAE

Polyplectropus bradleyi sp. n. (Figs. 7, 8)

Honiara, 4–8.x.1953, 1 ♂, 1 ♀.

Tapenanje, 10–15.xii.1953, 5 ♂, 3 ♀.

Head fuscous, with pale ochraceous warts. Antennae ochraceous, moderately stout (incomplete). Palpi ochraceous. Pronotum ochraceous, meso- and metanota fuscous, scutellum and scutal warts of mesothorax ochraceous. Legs dull ochraceous. Abdomen ochraceous. Wings pale fuscous, with slightly darker veins, neuration typical of genus.

♂ GENITALIA. Upper part of ninth segment membranous, projecting beyond the eighth as a small, triangular lobe. Centre of ventral margin produced and hairy. Tenth segment divided dorsally, complex. From the side it forms a short, deep plate with a rounded apical margin, its lower apical angle produced in three branches. The upper is more sclerotized and forms an incurving hook. Below it is a transparent, hairy finger and within this at its base is a shorter, flattened, triangular

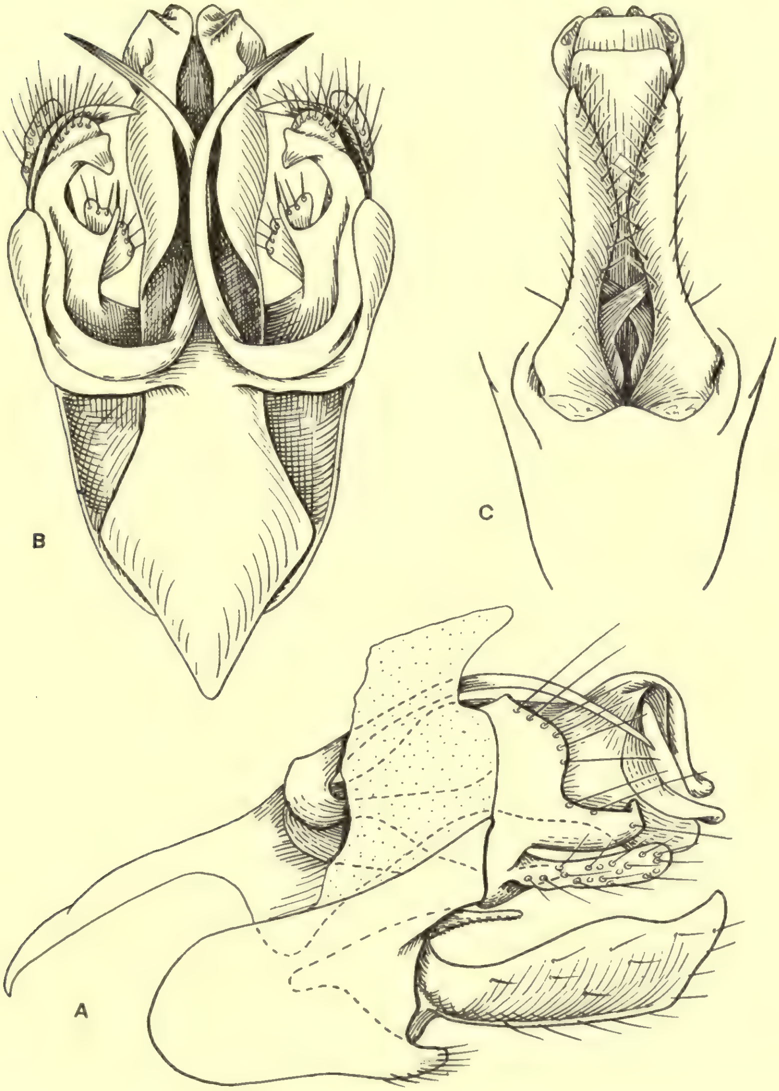

FIG. 7. *Polyplectropus bradleyi* sp. n. ♂ genitalia. (A), lateral ; (B), dorsal (upper part of ninth segment omitted) ; (C), claspers and aedeagus, ventral.

lobe, fringed with hairs. This is more clearly seen in a preparation in dorsal aspect, in which aspect can also be seen a short, transparent finger, lying above it. From the basal margin of the tenth segment arises a slender spine, directed first basally, then curving apically and downward, situated above and to one side of the aedeagus. The latter is stout, with a pair of thin, narrow plates arising from its dorsal surface near the apex and curving sinuously down towards it. Clasper sinuous, apex slightly dilated, obliquely truncate. From beneath, the apex is acute. The outer surface of the clasper is concave and at the base there is a short, inner branch.

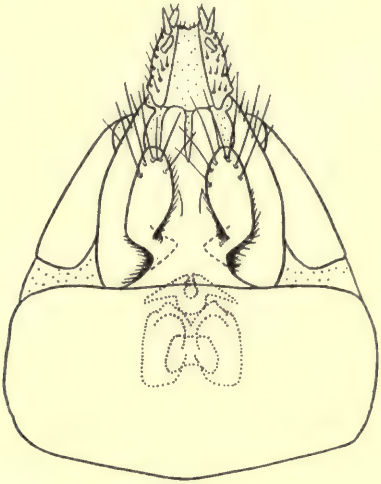

FIG. 8. *Polyplectropus bradleyi* sp. n. ♀ genitalia, ventral.

♀. Resembling male in coloration, antennae a little more slender. Median tibia moderately dilated. Ninth tergite narrowed above, lateral gonapophyses spatulate. Tenth segment short, with three pairs of apical processes, median pair acute, others rounded.

Length of fore wing, 4 mm.

♂ type, ♀ allotype (Tapenanje) in 2% formaldehyde solution, wings of ♂ and abdomens of ♂ and ♀ mounted as microscope preparations, paratypes in 2% formaldehyde solution. This species appears to approach *P. javanicus* Ulmer in the structure of the male genitalia, especially in the side view of the clasper and in the presence of two long, curved spines. It differs in the more complex tenth segment and the produced centre of the ninth sternite. Ulmer does not figure the aedeagus of his species.

Nyctiophylax sp.

Tapenanje, 10–15.xii.1953, 1 ♀.

Family HYDROPSYCHIDAE

Hydropsyche tapena sp. n. (Fig. 9)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour pale ochraceous, wings denuded of pattern. Antennae (incomplete) apparently without the customary spiral marking. Meso- and metanota marked with fuscous on the shoulders. Venation typical of the genus.

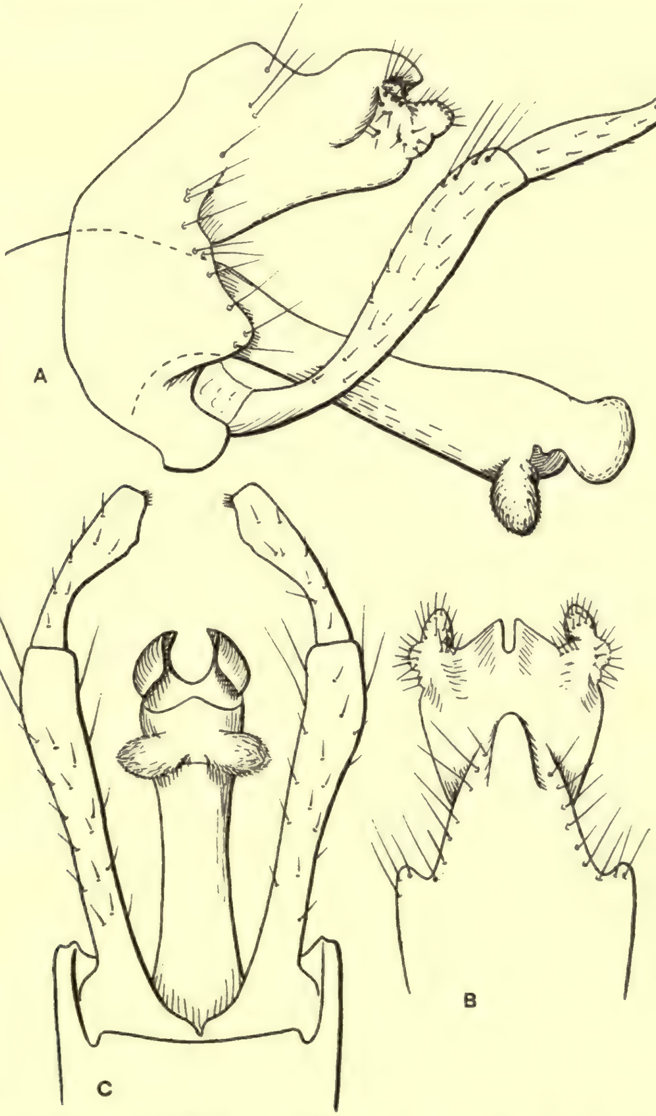

FIG. 9. *Hydropsyche tapena* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), claspers and aedeagus, ventral.

♂ GENITALIA. Ninth segment with large, triangular side-pieces, dorsal margin triangularly produced and fused with the tenth segment. The latter forms the usual hood ; from the side the upper margin is strongly sinuous, terminating in a blunt hook. From above, this hook is medianly excised and forms two triangular lobes. Lateral angles of tenth segment with short, rounded processes, densely setose, and at their bases are some setose warts. Aedeagus slender, slightly clavate at its apex, which is divided into four lobes. Two are reniform in side view, hollowed on their inner surfaces and separated by a rounded excision. Below them are two somewhat roughened processes, capable of being directed downward and outward. Clasper long and slender, sinuous in side view, basal segment twice as long as apical ; in ventral view, the latter is dilated internally in its apical half, apex truncate, with a tuft of short setae.

Length of fore wing, 9 mm.

♂ type in 2% formaldehyde solution, abdomen mounted as microscope preparation. This species resembles *H. tepoka* Mosely (New Zealand) in the form of the male genitalia, particularly in the quadrifid armature of the apex of the aedeagus, and the rather blunt processes of the tenth segment. The claspers are more slender and the apical segment proportionately longer. It may be mentioned here that in the New Zealand species of *Hydropsyche*, the cross-vein closing the median cell in the hind wing has proved rather unstable and is frequently absent, the venation thus resembling *Cheumatopsyche*. Mosely has, in fact, placed Tillyard's *philpotti* in this genus, in spite of the close resemblance of the male genitalia to *Hydropsyche colonica* McLachlan. There is, however, another character which can be used to separate *Hydropsyche* and *Cheumatopsyche*, namely the relative degree of separation of *M* and *Cu* in the hind wing. In *Hydropsyche*, *M* and *Cu* run very close together in the basal half of the wing, whereas in *Cheumatopsyche* they are well separated. On these grounds, Tillyard's *philpotti* should be returned to *Hydropsyche*.

Family HYDROPTILIDAE

Hydroptila triloba sp. n. (Fig. 10)

Honiara, 4–8.xii.1953, at light, 4 ♂, 7 ♀.

The wings show traces of fuscous bands near base and about mid-way. In the ♂ the antennae have about thirty segments, and there are two pyriform scent-organ caps on the back of the head, but I have been unable to make out any scent-organs.

♂ GENITALIA. Ninth segment with its dorsal, apical margin projecting in a short triangle ; ventral margin widely excised, the lateral margins forming short, blunt fingers, carrying a few setae. Tenth segment fused to ninth, lightly sclerotized, long, deeply excised in dorsal aspect, and with a semi-membranous, truncate plate between the lateral arms, but separated from them, except at the base. In side view, the lateral arms are slightly clavate. At the base of the excision is an elevated acute tooth. Aedeagus long, slender, with the usual twisted spine or sheath. Claspers long, narrow, slightly down-curved with blunt apices. The outer surfaces carry a number of stout, socketed teeth and above the bases of the claspers is a lightly sclerotized, pointed plate, a little shorter than the claspers, and also with two similar teeth on its lower surface. There is a short, pointed ventral process on the seventh segment.

Length of fore wing, 2 mm.

♂ type mounted as microscope preparation, paratypes in 2% formaldehyde solution. This species is closely allied to *Hydroptila incertula* Mosely (S. Queensland). It differs in the presence of a short, acute tooth at the base of the excision of the tenth segment, the clavate apices of the lateral arms of this excision and the less down-curved claspers.

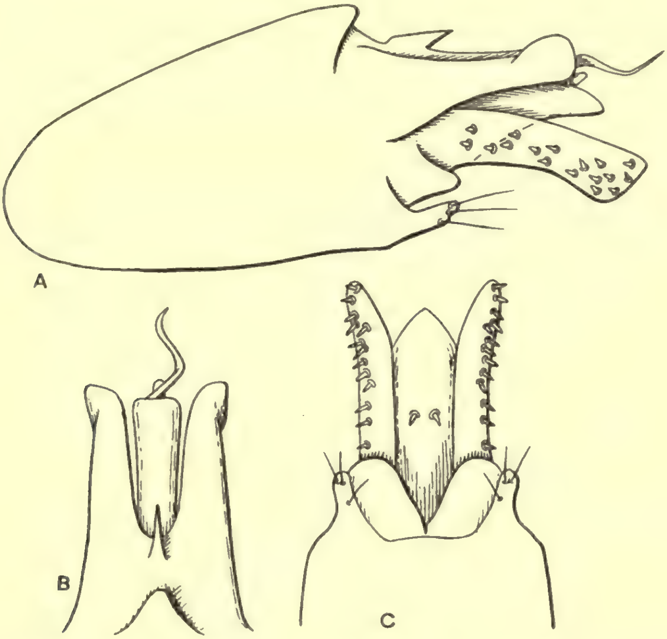

FIG. 10. *Hydroptila trilobata* sp. n. ♂ genitalia. (A), lateral; (B), tenth segment and aedeagus, dorsal; (C), claspers, ventral.

Family CALAMOCERATIDAE

Anisocentropus sp.

Tapenanje, 10–15.xii.1953, 2 ♂, 1 ♀.

These specimens have the wings completely denuded of pubescence. They may possibly be *Anisocentropus solomonis* Banks, described from two females as having a broad, irregular band of blueish or purplish scales on the fore wing, but in view of the denuded state of the present specimens, I think it better not to attempt to identify them beyond the genus.

Family LEPTOCERIDAE

Oecetis reticulata sp. n. (Fig. 11)

Honiara, 4–8.x.1953, at light, 1 ♂.

General colour very pale fuscous, membrane of fore wing shaded with deeper fuscous at the anastomosis and at the main forks.

♂ GENITALIA. Eighth tergite produced in a large, reticulated shield, covering the ninth and tenth segments from above. It is pale waxy yellow, bordered with dark brown. Preceding tergites normal. Ninth segment with its upper part reduced to a narrow, transverse band, to which is attached the tenth segment. This takes the form of two long, slender, down-curved spines, each dilated laterally before the acute apex. At their bases arise the cerci, shorter than the spines, slender, with moderately clavate apices. Aedeagus short, down-curved. Claspers broad and contiguous basally, each soon tapering to a slender, calliper-like apex, projecting beyond the tenth segment. At its base arise two short, curved branches, directed upward and tailward, the basal branch on the upper margin distinctly serrate, the other arising nearer the inner margin.

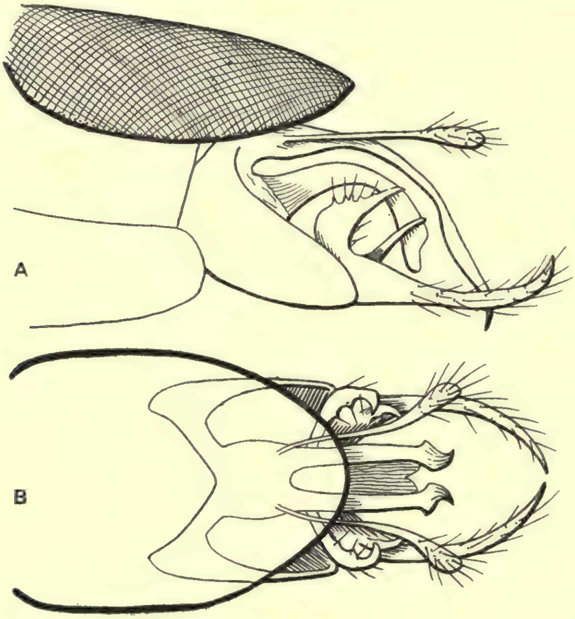

FIG. 11. *Oecetis reticulata* sp. n. ♂ genitalia. (A), lateral; (B), dorsal.

Length of fore wing, 4·5 mm.

♂ type mounted as a microscope preparation. In the shield-like eighth segment and slender, clavate cerci this species resembles *O. testacea* (Curtis), but it differs from most of the species with reticulated tergites in having only the eighth so formed.

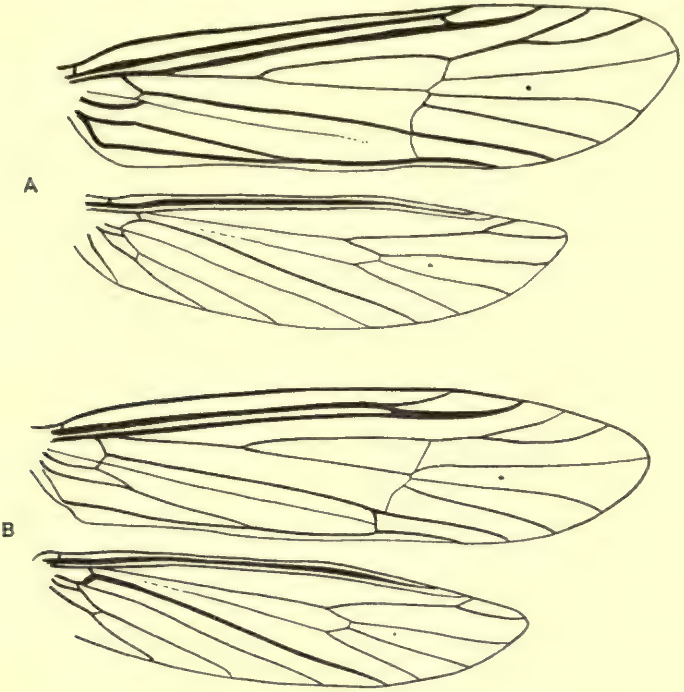

FIG. 12. *Triaenodes* spp. n. ♂ wings. (A), *T. picea*; (B), *T. excisa*.

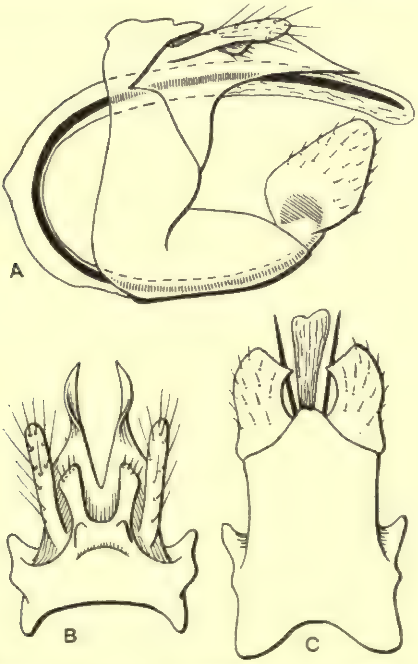

FIG. 13. *Triaenodes picea* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

Triaenodes picea sp. n. (Figs. 12A, 13)

Tapenanje, 10–15.xii.1953, 3 ♂.

General colour of the body and fore wings piceous, the anastomosis of the latter white. Antenna with the two basal segments piceous, remainder pale fuscous, with darker annulations. The basal segment has on its inner surface a whitish false suture, somewhat simulating the scent-organ cap in certain species of *Triaenodes* (*Triaenodella*). There are indications of a tuft of long hairs on the inner surface. Palpi and legs fuscous. Venation fairly typical of *Triaenodes*, in fore wing Cu_1 is a strong vein, running straight to the wing margin. The free, basal part of Cu_1 is very weak, resembling a cross-vein, apical part fused with the extended anal vein. Cu_2 is more or less obsolete towards its apex, in the type not reaching the wing margin.

♂ GENITALIA. Ninth segment with its upper part reduced, apical margin produced in a pair of short thin, obliquely truncate lobes, separated by a U-shaped excision. Tenth segment forming a thin hood, from above deeply and acutely excised, the sides of the excision with acute apices. Cercus digitate, about two-thirds as long as tenth segment. Aedeagus long, slender, semi-membranous, stiffened by two sclerotized ribs. It apparently arises near the base of the claspers and thence runs basally before curving upward and tailward beneath the tenth segment. Running parallel with the aedeagus on each side is a long, slender spine. Clasper short, stout, somewhat rhomboidal from the side, truncate apically from beneath, with a serrate ridge on its inner surface.

Length of fore wing, 5 mm.

♂ type mounted as a microscope preparation, 2 ♂ paratypes in 2% formaldehyde solution. The genitalia of this species are similar in pattern to those of a number of North American species of *Triaenodes*, though of course differing in detail. It is quite distinct from its nearest geographical neighbours, *T. volda* Mosely and *T. insulana* Ulmer.

Triaenodes excisa sp. n. (Figs. 12B, 14)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour dark ochraceous. Antenna with long basal segment, its inner surface with a dense tuft of hairs, which become detached by clearing in caustic potash solution for preparation. Wing venation more typical of *Triaenodes* than in *T. picea*, Cu_2 terminating in Cu_{1b} in fore wing. Apex of fore wing less broadly rounded.

♂ GENITALIA. Ninth segment with the lower part only slightly projecting. Dorsal apical margin produced in two small, rounded lobes and below them a pair of bifid fingers. Tenth segment forming a bifid hood, the branches acute from above, rounded apically from the side. Cerci digitate, slightly longer than the bifid fingers of the ninth segment. Aedeagus and spines much as in *T. picea*. Claspers stout, about as long as ninth segment. From the side each is pyriform, narrowest at base, apex excised and armed with teeth.

Length of fore wing, 4·5 mm.

♂ type mounted as a microscope preparation. This species is closely related to *T. picea* sp. n., but differs in its more normal venation, less broadly rounded apex of fore wing, longer and bifid processes to the ninth segment, differently shaped tenth segment, shorter lower part of ninth segment and larger, pyriform claspers.

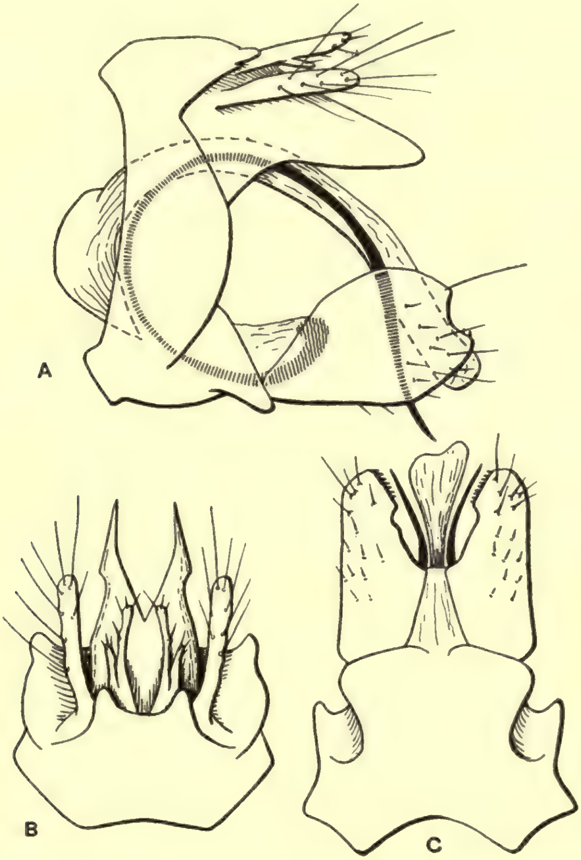

FIG. 14. *Triaenodes excisa* sp. n. ♂ genitalia. (A), lateral ; (B), ninth and tenth segments, dorsal ; (C), ninth segment, claspers and aedeagus, ventral.

Triaenodes trifida sp. n. (Fig. 15)

Tapenanje, 10–15.xii.1953, 2 ♂.

General colour ochraceous, head and thorax rather darker. Antenna light ochraceous with darker annulations. Basal segment with a suture along its upper surface, from which can be exserted a membrane, covered with scales. In a fluid-preserved specimen these scales can be seen as a reddish mass within the segment. Wings more acute apically than in *T. excisa*, venation much as in the two previous species.

♂ GENITALIA. Ninth segment reduced dorsally to a narrow, transverse band. Tenth segment composed of a very long, slender, pale finger, arched from the side, slightly clavate and setose apically. On either side of this central process is an even longer, downwardly curved, slender spine. Cerci short, digitate. Aedeagus long, moderately slender, its apex deeply bifid and membranous. Clasper about as long as ninth segment, from the side about two and a half times as long as wide, apex terminating in a small hook. The inner basal angles are fused and produced tailward in a pair of divergent, downwardly curved blades, with rounded apices.

Length of fore wing, 3·25 mm.

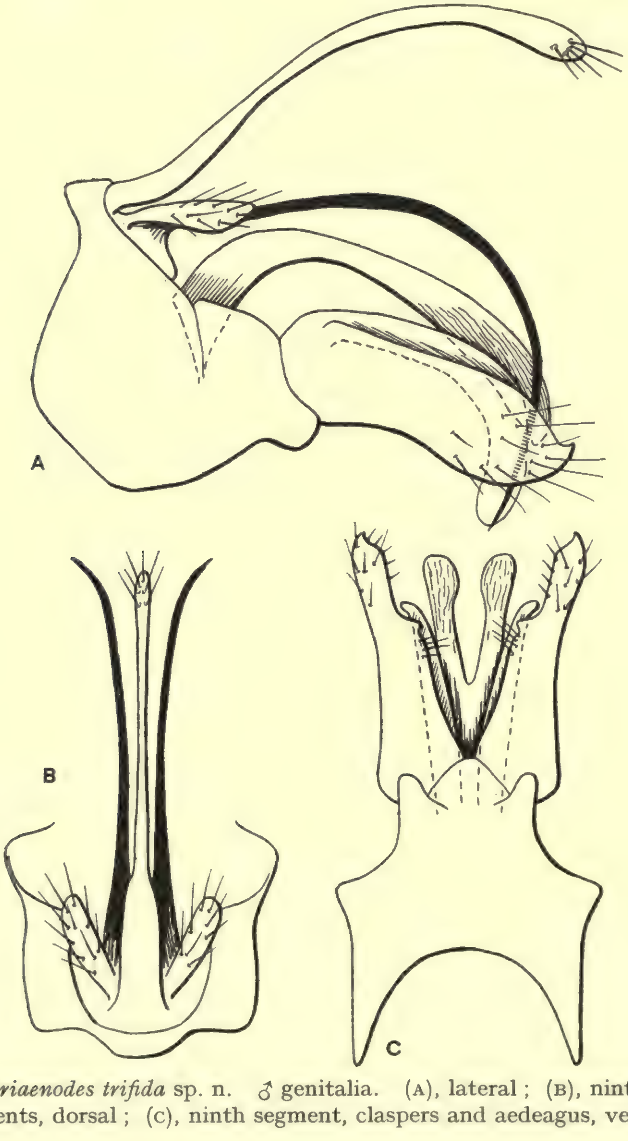

FIG. 15. *Triaenodes trifida* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

♂ type mounted as a microscope preparation, ♂ paratype in 2% formaldehyde solution. The presence of scent scales on the basal segment of the antenna recalls the tuft of scent hairs on the antenna of *Triaenodes chelifera* (Mosely), but in the present species there is no flap-like cover, the scales being on a membrane and when not exserted, are housed within the basal segment. *T. trifida* differs from the two previous species in the long median process and lateral spines of the tenth segment, and the shorter and broader, blade-like processes from the bases of the claspers, which latter are even more elongate.

Triaenodes lanceolata sp. n. (Fig. 16)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour dark ochraceous, fore wing membrane pale fuscous. Antennae broken, basal segment of each without scent scales. Maxillary palpi incomplete. Venation typical of genus.

♂ GENITALIA. Ninth segment nearly as long dorsally as ventrally, dorsal apical margin triangularly produced at its centre. Tenth segment composed of a narrow lanceolate plate, fringed with teeth and below it a thin hood, apical margin acutely

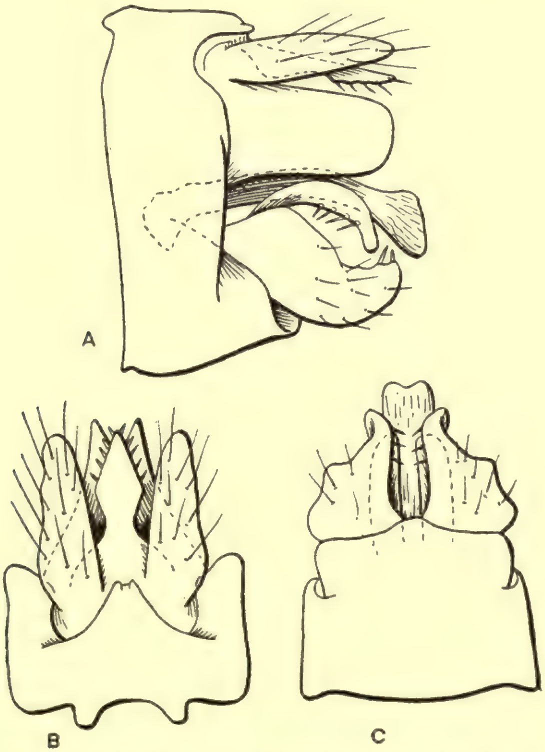

FIG. 16. *Triaenodes lanceolata* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

excised in dorsal view, about as long as median process. Cerci about as long as tenth segment, stout, digitate. Aedeagus short, moderately slender, its membranous apex slightly curved. Clasper about as long as ninth segment, stout and slightly upcurved from the side, broad at base beneath, outer margin sinuously converging to make a slender apex, which is toothed on its inner surface.

Length of fore wing, 8·25 mm.

♂ type mounted as microscope preparations. This species differs from those previously described in this paper in the shorter, less curved aedeagus, the less reduced upper part of the ninth segment and the different form of the tenth segment.

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NATURAL HISTORY

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D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 8
LONDON: 1957

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BY

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Pp. 309–320 ; *Text-figures* 1–5

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ODONATA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

By D. E. KIMMINS

THE Odonata dealt with in this paper were collected by Mr. Bradley during stops on Guadalcanal on his way to and from Rennell Island. The Odonata of Guadalcanal are better known than the Trichoptera, and Lieftinck (1949) lists twenty-eight species. Mr. Bradley collected fourteen species of which six were additions to those listed by Lieftinck, these six including at least three new species and two new genera. There is a high proportion of species endemic to the Solomon Islands, no fewer than fourteen of the total of thirty-four being restricted to the Solomons.

The types of the new species are in the British Museum (Natural History).

ODONATA

ZYGOPTERA

Family LIBELLAGINIDAE

Rhinocypha liberata Lieftinck

Tapenanje, 10–23.xii.1953, 22 ♂, 11 ♀.

The present examples differ slightly from Lieftinck's description and from Solomon Islands specimens (ex McLachlan collection), determined by myself as *R. liberata*, but I do not consider the differences to justify the erection of a new subspecies. The specimens are a little larger and the brown apices of the wings appear to be a little more extensive. In many examples the infuscation of the fore wing extends almost completely to the apical margin, even in teneral specimens, and in none is the paler space distad of the pterostigma as distinct as in Lieftinck's description. In teneral examples the apical half of the pterostigma is pale cream.

♀. Humeral stripe a little less reduced than in ♂. Abdomen black, with a fine, yellowish, median carina. Sides of the segments marked with deep yellow : segment 1, one large spot ; segments 2–7 with two spots, the anterior the larger, the spots becoming progressively reduced towards apex of abdomen ; segment 8 with only one basal spot. Membrane of wings pale yellowish, hind wing with a brownish apical patch, varying in size and intensity in individuals up to nearly the apical third, paler along the costal margin. Extreme apex of wing narrowly opaque whitish. Fore wing sometimes with very indistinct brownish shading in apical third but not reaching extreme apex, which is also very narrowly opaque whitish. Pterostigma dark brown, apical half deep cream to reddish brown.

Family PROTONEURIDAE

Notoneura salomonis (Selys)

Tapenanje, 10–23.xii.1953, 26 ♂, 15 ♀.

DISTRIBUTION. Solomon Islands, New Britain, New Guinea.

Family PLATYCNEMIDIDAE

LIEFTINCKIA gen. nov.

(Text-fig. 1)

♂. Head large, eyes conspicuous and globular. Mouth parts and clypeus projecting, about half as wide as distance between eyes. Median excision of labium U-shaped, about twice as deep as wide. Antenna with basal segment short, third about twice as long as first and second together. Prothorax without projections. Synthorax rather short. Legs slender, not unusually long, hind femur extending to apex of first abdominal segment. Tibiae not dilated; tarsi of moderate length, claws with a strong, subapical tooth.

Wings (Text-fig. 1A) elongate, hyaline, distinctly petiolated, petiolation ceasing at level of first antenodal, distad of *Ac*. Apices of both wings with a finely undulated margin. Nodus situated at a little more than one-fourth the distance between base and the distal margin of the pterostigma (5 : 18) in fore wing and about one-third (7 : 22) in hind wing. Pterostigma large, irregularly lozenge-shaped, costal margin slightly concave, distal margin angled. Two rows of cells between C and R_1 beyond the stigma. Marginal course of M_4 and Cu_2 zigzag. Origins of Rs and M_3 close together, M_3 at or slightly before subnodus, Rs usually not more than half a cell beyond. Quadrilateral about three times as long as broad, lower basal angle acute. *Ac* situated distinctly basad of first antenodal cross-vein, *Ab* extending back to level of first antenodal in fore wing and to mid-way between first and second antenodal in hind wing.

Abdomen moderately slender. Posterior tergal margin of tenth segment somewhat elevated and with a triangular, median impression. Stalk of penis without lateral bristles. Distal segment arching backwards, rather narrow but dilating towards apex, which is widely excised, angles produced in spatulate lobes. Lamina interna slender, acute (Text-figs. 1D, E).

Superior anal appendages short, triangular, with a downwardly directed inner branch. Inferiors rather longer, narrowed to a finger apically.

♀. Much as in ♂. Posterior lobe of prothorax with the sides produced in deflexed rounded lobes. Between them the anterior margin of the mesepisternum is raised in a transverse, rounded process. Apex of abdomen somewhat damaged, superior anal appendages short and conical. Valves short, stout, slightly curved and tapering to blunt apices.

Type-species, ***Lieftinckia salomonis*** sp. n.

I am in some doubt as to the correct place of this genus within the Platycnemididae. The ♂ anal appendages recall those of *Platycnemis*, the superiors being shorter than the inferiors, with an internal, downwardly directed branch, but the tibiae show no sign of dilatation. *Ac* is situated relatively nearer to the base of the wing than in *Tatocnemis*, being basad of the first antenodal. The anal bridge does not reach *Ac*

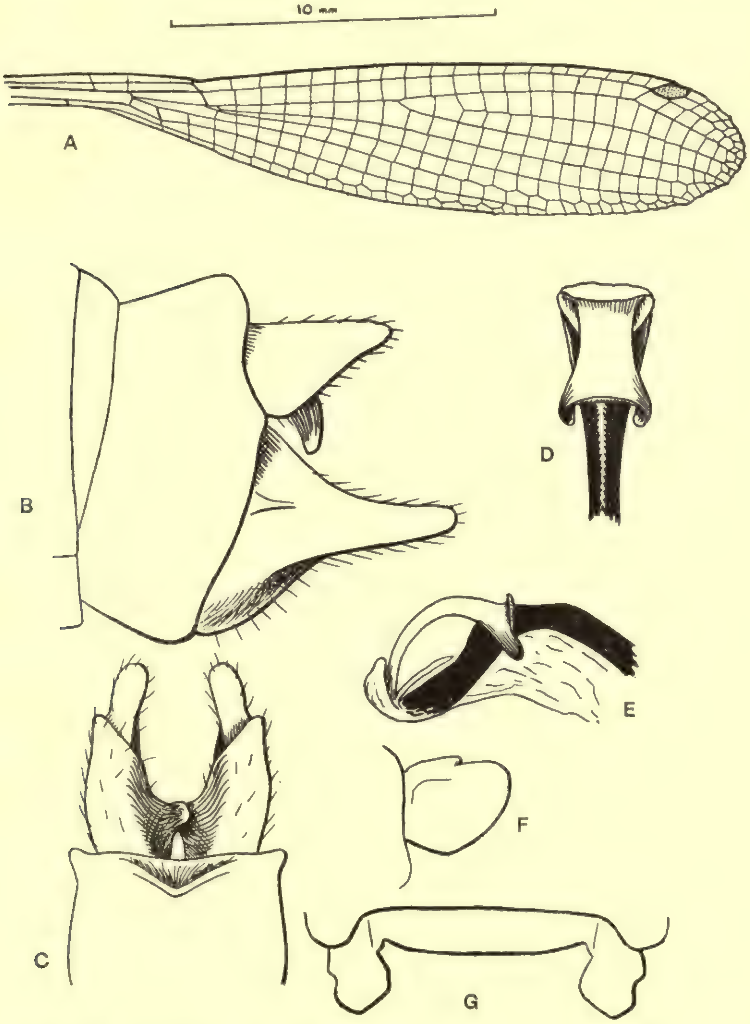

FIG. 1. *Lieftinckia salomonis* gen. et sp. n. ♂, ♀. (A), ♂ fore wing; (B), ♂ anal appendages, left lateral; (C), ♂ anal appendages, dorsal; (D), ♂ penis, ventral; (E), ♂ penis, left lateral; (F), ♀ posterior lobe of prothorax, left lateral; (G), ♀ posterior lobe of prothorax, dorsal.

but runs into the wing margin at the level of the first antenodal. The form of the posterior lobe of the prothorax in the female and the inflation of the anterior margin of the synthorax also have their counterparts in *Platycnemis*. The penis and the venation (apart from the position of *Ac*) resemble *Idiocnemis*, but the extreme basal position of *Ac* and the presence of two rows of cells between *C* and R_1 beyond the stigma will distinguish *Lieftinckia* from either *Platycnemis* or *Idiocnemis*.

It gives me much pleasure to name this interesting genus after Dr. M. A. Lieftinck, now at Leiden Museum, who has done so much to extend our knowledge of the Odonata of Papua, Indonesia and the associated islands.

Lieftinckia salomonis sp. n.

(Text-fig. 1)

Tapenanje, 10–23.xii.1953, 2 ♂, 1 ♀.

Specimens possibly rather teneral. General appearance cream, dorsum of synthorax dark brown, abdomen with paler brown markings.

♂. Head with labrum, bases of mandibles, clypeus, frons and vertex cream, occiput fuscous. Antenna with flagellum and apical half of second segment fuscous. Labium yellowish. Eyes dark brown.

Pronotum dark fuscous above, sides and venter creamy yellow. Posterior lobe of pronotum simple, margin broadly rounded. Synthorax with dorsum dark fuscous, which colour slightly overlaps the humeral suture, and a faint brownish streak along the posterior margin of mesepimerum, otherwise creamy yellow. Coxae, trochanters and femora yellowish, apices of the latter narrowly fuscous. Tibiae and tarsi dark brown.

Wings hyaline, veins dark brown, venation as in Text-fig. 1A and in generic description. Pterostigma pale brownish, narrowly bordered inside margins with cream.

Abdominal segments 1–6 cream, each with an apical annule of brownish, narrow on segment 1 and gradually increasing in width to segment 6. Segments 7–10 pale brownish (somewhat discoloured), anal appendages pale brownish.

Superior anal appendage (Text-figs. 1B, C) about as long as tenth segment, from the side triangular and with an acute apex. From above it is also acutely triangular, but the inner margin towards the base is produced downwards in a short, flattened finger, the inner upper margin thus appearing sinuate. Inferior appendage about one and a third times as long as superior, broad basally, tapering to a narrow, blunt finger, slightly incurved.

♀. Head as in ♂. Prothorax coloured as in ♂. Posterior lobe (Text-figs. 1F, G) transverse, with its lateral margins bent sharply downwards and produced backwards in rounded lobes, to form a wide, shallow, somewhat rectangular excision. Synthorax with its anterior margin inflated in a transverse, rounded lobe, its posterior margin feebly excised. Markings of synthorax and legs as in ♂. Wings much as in ♂. Abdomen cream, ringed with brownish as in ♂ on segments 1–6, coloration of remaining segments pale, obscure. Genitalia as in generic description.

Length of abdomen + appendages, ♂, 34–35 mm., ♀, 32 mm.; hind wing, ♂, 23 mm., ♀, 23 mm.

Lieftinckia ? sp.

Tapenanje, 10–23.xii.1953, 1 ♀.

This rather teneral and crushed specimen is referred to *Lieftinckia* with some doubt. The position of the anal crossing and anal bridge is typical, but M_3 arises at the subnodus and *Rs* half to one cell beyond. The cells beyond the stigma are in one row only. The posterior lobe of the prothorax is not excised apically and the femora are more shaded with brownish. Tergites 3–7 of the abdomen have a median brownish band in addition to the apical one.

Family COENAGRIIDAE

Pseudagrion incisurum Lieftinck

Tapenanje, 10–23.xii.1953, 9 ♂, 1 ♀.

DISTRIBUTION. Guadalcanal.

Teinobasis bradleyi sp. n.

(Text-fig. 2)

Tapenanje, 10–23.xii.1953, 2 ♂ (1 incomplete).

♂. Labium and lower mouth parts very pale blue, mandible bases and genae bluish green. Labrum and clypeus black, shining, the latter with three small, blue-green spots along the anterior margin, postclypeus black, with a wide, transverse, blue-green stripe from side to side. Frons, vertex and occiput dull black, with a faint greenish sheen. Antennal bases blue-green in front, segments piceous.

Prothorax dull black above, sides light bluish, pruinescent. Posterior lobe simple, flattened, its distal margin evenly and shallowly rounded.

Synthorax (Text-fig. 2A) as far as the first lateral suture (and in the upper fifth to the second lateral suture) black, between the humeral sutures with a metallic greenish sheen. Mesepimerum with a small blue spot at its upper angle, adjoining the humeral suture. Remainder of synthorax blue, slightly pruinescent beneath. Coxae pale bluish, femora piceous above, pale bluish beneath, tibiae and tarsi reddish piceous. Spines black. Claws without inferior sub-apical tooth.

Wings hyaline, venation black. Apical margin very slightly and widely undulated or excised between Cu_1 and M_3, M_3 and M_2. Origin of M_3 slightly before, and *Rs* at, subnodus. Fifteen to sixteen postnodal cross-veins in fore wing, 14 in hind. Three postquadrangular antenodal cells. Cu_2 long, terminating at level of tenth postnodal. Pterostigma piceus, moderately oblique, about twice as long as high.

Abdomen slender, black above, segment 1 with a narrow, transverse, blue apical streak, and a rounded blue spot filling most of side. Segment 2 with an elongate blue patch on each side. Remaining segments with lower, lateral margins bluish or yellowish. Tenth segment with the median impressed area triangular. Anal appendages as in Text-figs. 1B, C, superiors piceous, inferiors pale bluish at base, piceous apically.

♀ unknown.

Length of abdomen + appendages, ♂, 39 mm. ; hind wing, 26 mm.

In form of genitalia, *T. bradleyi* forms one of a group of species in which the superior anal appendages are tapered and slightly incurved apically, extending beyond the inferiors. It most nearly approaches *T. metallica* Foerster, but the superiors are less abruptly tapered and the inferiors have the apex not acute but blunt and obtuse-angled. The thoracic colouring is less metallic and extends dorsally to the second lateral suture. The slight undulation of the wing apices recalls that in the genus *Leptocnemis*, but the appendages are rather different.

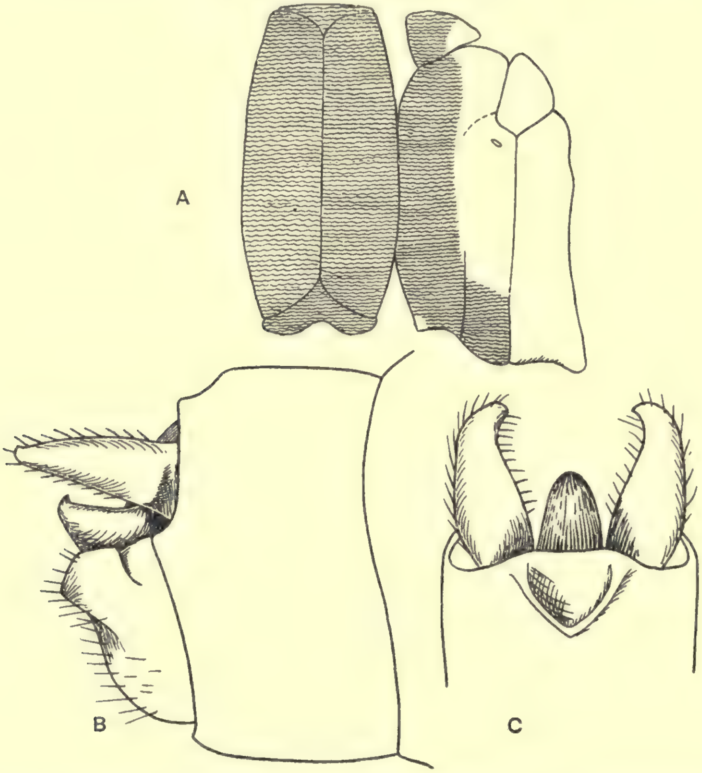

FIG. 2. *Teinobasis bradleyi* sp. n. ♂. (A), diagram of thoracic pattern ; (B), anal appendages, right lateral ; (C), anal appendages, dorsal.

Agriocnemis salomonis Lieftinck

Honiara, 5–9.x.1953, 1 ♂.

DISTRIBUTION. Solomon Islands.

ANISOPTERA

Family CORDULIIDAE

GUADALCA gen. nov.

(Text-figs. 3, 4)

Eyes strongly globular, broadly contiguous. Frons moderately produced, not as broad as thorax (about half the width of the head and eyes). ♂ with a carina on the flexor surface of all tibiae on anterior and median legs occupying about the apical fourth, on the posterior extending almost the whole length of the tibia. Ventral surfaces of median and posterior femora armed with numerous short, black teeth. Wings (Text-fig. 3) hyaline or faintly brownish, ♂ with a pale, golden-yellow area at base of hind wing, not extending beyond the basal cubital cross-vein, and with a trace of this colour at extreme base of fore wing. ♀ with veins lightly margined with brownish. Triangles in both wings divided, subtriangle in hind wing present. Antenodal cross-veins 10–12 in fore wing, 7–8 in hind wing. Arculus at about the level of the second antenodal in both wings, oblique, branches separate or arising at a point, in the posterior half of arculus. Nodus in fore wing situated distad from middle of wing. Stigma in both wings short, rhomboidal, about twice as long as wide. Anal loop rather feebly developed, three cells wide at apex ; two rows of cells between 2A and margin of hind wing in ♂, three rows in ♀.

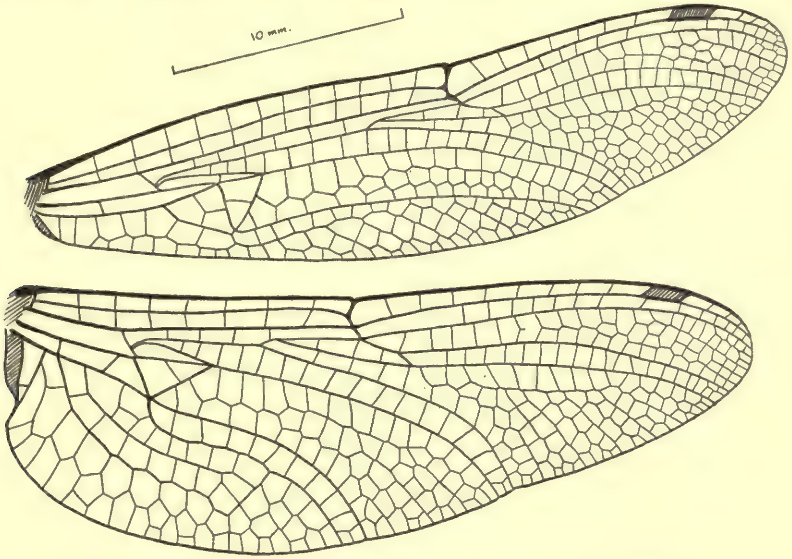

FIG. 3. *Guadalca insularis* gen. et sp. n. ♂ wings.

Type-species, ***Guadalca insularis*** sp. n.

This genus appears most closely related to *Antipodochlora* Fraser (New Zealand), from which it differs in its narrower frons, the greater number of antenodal cross-veins in both wings, the more distally situated nodus of the fore wing and the less well-developed anal loop of the hind wing. *Anticordulia* Needham and Bullock (Chili) is also closely related but differs in the more robust body, longer legs, nodus of fore wing about mid-way, fewer antenodals, and in the hind wing generally no second cubital cross-vein (subtriangle absent) and three rows of cells between $2A$ and the wing margin. It should be remembered that in the group of Corduline genera to which these belong, the second cubital cross-vein in the hind wing tends to be unstable and too much reliance should not be placed in it as a generic character in single specimens.

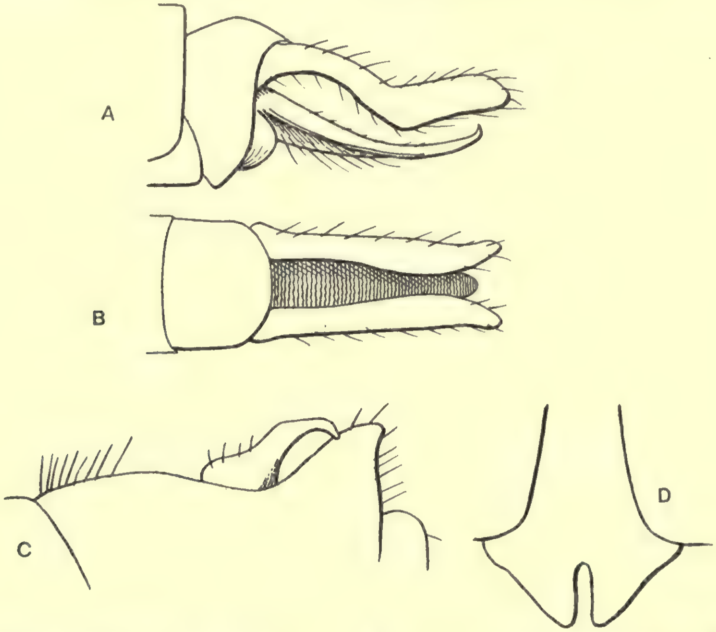

FIG. 4. *Guadalca insularis* gen. et sp. n. ♂, ♀. (A), ♂ anal appendages, left lateral; (B), ♂ anal appendages, dorsal; (C), ♂ genitalia, second segment, right lateral; (D), ♀ vulvar lamina, ventral.

Guadalca insularis sp. n.

(Text-figs. 3–4)

Tapenanje, 10–23.xii.1953, 9 ♂, 1 ♀.

♂. Head with vertex black with a greenish lustre. Frons with shining, metallic greenish-black triangles, sides and lower margin dull yellowish. Clypeus dull yellowish, labrum piceous, with a small orange spot. Labium dull yellowish.

Thorax metallic greenish, with a coppery sheen, a narrow brownish stripe on each side of and adjoining the median carina. Legs not unusually long, reddish-brown, with black spines and teeth: tarsi dark brown.

Wings (Text-fig. 3) hyaline or slightly smoky yellowish, and with a small patch of pale golden-yellow at the base of the hind wing, not extending beyond the basal cubital cross-vein. Venation black, stigma reddish-brown.

Abdomen slender (including appendages a little shorter than hind wing), slightly constricted at the third segment, then gradually dilating again to the seventh segment. Segment 1 yellowish-brown, darker above ; 2 yellowish-brown, with a dorsal patch of greenish-black. Remaining segments piceous above, with a purplish metallic sheen ; 3–9 with a narrow, dull orange apical margin, apical lateral margins dull orange, which colour also appears to a lesser degree in the basal lateral angles of segments 4–7. Segment 10 blackish. Ventral surface of abdomen dull yellowish with darker margins.

Genitalia of the second segment (Text-fig. 4C) with the anterior lamina small, transverse, not projecting beyond the margins of the segment in side view, dull yellowish-brown. Hamules prominent, broad at base, tapering to slender, moderately hooked apices, about as long as the genital lobes. The latter are stout, triangular, with rounded apices. Superior anal appendages (Text-fig. 4A, B) black, more than twice as long as tenth segment, slender, cylindrical from above, with divergent apices. From the side they are slightly down-curved to just beyond the middle, then slightly angled upwards and straight. Inferior appendix yellowish, almost as long as superiors, in dorsal view forming a narrow triangle with upturned apex.

♀. Coloured much as in male but rather darker. Venation bordered with yellowish-brown. Orange markings on abdomen less extensive. Anal appendages blackish. Vulvar lamina (Text-fig. 4D) triangular, with a narrow, U-shaped, median excision.

Abdomen with appendages, ♂, 32–34 mm., ♀, 33.5 mm.

Length of hind wing, ♂, 30–32 mm., ♀, 35 mm.

Family LIBELLULIDAE

Tapeinothemis boharti Lieftinck.

(Text-fig. 5)

Tapenanje, 10–23.xii.1953, 13 ♂, 13 ♀.

This species was described from a single female from Florida Island and I am therefore giving a supplementary description of the points in which the male differs. (Adult.) Centre of dorsum of synthorax with white pruinescence. Abdominal segments 2–8 densely coated with white pruinescence above. In less mature males, the dorsum of segments 2–7 is shining metallic blue-black, only partly obscured with pruinescence, 8–10 dull black. Segment 1 is shining black above, with a lemon-yellow triangle in each apical angle. In side view, segments 2–3 are lemon-yellow towards the bases. Genitalia of second segment and appendages as figured. One male has been marked as *allotype*.

DISTRIBUTION. Solomon Islands.

Agrionoptera insignis insularis Kirby

Tapenanje, 10–23.xii.1953, 1 ♂.

Honiara, 5–9.x.1953, 1 ♀.

DISTRIBUTION. Solomon Islands.

Protorthemis woodfordi (Kirby)

Honiara, 5–9.x.1953, 1 ♂.
Tapenanje, 10–23.xii.1953, 6 ♂, 1 ♀.
DISTRIBUTION. Solomon Islands.

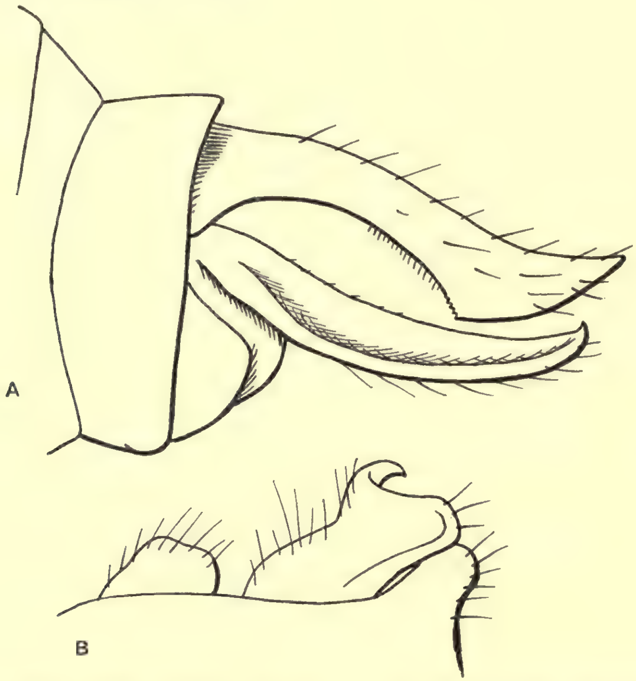

FIG. 5. *Tapeinothemis boharti* Lieftinck ♂. (A), anal appendages, left lateral; (B), genitalia, second segment, right lateral.

Orthetrum villosovittatum bismarckianum Ris

Honiara, 5–9.x.1953, 1 ♀.
Tapenanje, 10–23.xii.1953, 5 ♂, 3 ♀.
DISTRIBUTION. Bismarck Archipelago, Solomon Islands, Amboina.

Diplacodes trivialis (Rambur)

Honiara, 10–14, 19–29.ix.1953, 4 ♂, 1 ♀.
DISTRIBUTION. Seychelles, Asia, Philippine Islands, East Indies, Celebes, New Hebrides, Solomon Islands, Bismarck Archipelago, Australia, Fiji.

Neurothemis stigmatizans brahmina (Guerin)

Honiara, 5–9.x.1953, 5 ♂, 3 ♀.
Tapenanje, 10–23.xii.1953, 17 ♂, 7 ♀.
DISTRIBUTION. New Guinea, Aru Islands, Bismarck Archipelago, Solomon Islands, New Hebrides, Union Islands.

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A STUDY OF THE CHIRONOMIDAE (DIPTERA) OF AFRICA SOUTH OF THE SAHARA

PART III

PAUL FREEMAN

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 9
LONDON: 1957

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PART III

BY

PAUL FREEMAN

Pp. 321–426 ; 1 *Plate* ; 18 *Text-figures*

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A STUDY OF THE CHIRONOMIDAE (DIPTERA) OF AFRICA SOUTH OF THE SAHARA

PART III

By PAUL FREEMAN

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SYNOPSIS

Parts I and II of this Study were published as Nos. 1 and 7 of Vol. 4 of the *Bulletin of the British Museum* (*Natural History*) (1955–56). Part III continues the description of the Chironomid fauna of Africa south of the Sahara (Ethiopian Zoogeographical Region) and deals with the first half of the tribe Chironomini of the subfamily Chironominae, that is, with the large genus *Chironomus* and its allies, which are the genera including species that normally have two spurs on the posterior tibiae.

Following the classification used by F. W. Edwards in 1929, the species described here would represent the first half of the genus *Chironomus*, but the classification adopted in the present paper has reduced the extent of this large genus and uses the principles given in Part II for its restriction. Seven genera are recognized in this group for the African fauna, the genus *Chironomus* being used with seven subgenera. All the genera described by Kieffer and Goetghebuer have been identified with the exception of *Kribiobius* Kieffer which may well have been based on the female of a species of Tanytarsini (= Calopsectrini of Townes). As in the

Orthocladiinae many species resemble Palaearctic species, but there is more variety in this subfamily, perhaps because of its larger size and preference for warmer water habitats. Keys are given to genera, subgenera and species ; more than 100 species are described, 25 of which are new, and notes are given on 12 species of *Chironomus* (*Cryptochironomus*), which were described by Kieffer from females and which cannot be recognized from the descriptions.

INTRODUCTION

Parts I and II of this Study were published as Nos. 1 and 7 respectively of Vol. 4 of the *Bulletin of the British Museum* (*Natural History*) (1955–56). Reference should be made to Part I for a general introduction to the Studies and an historical survey of previous work on the African species ; methods of collection and examination, structure, notes on distribution, a key to subfamilies and other points of interest are also covered in that Part. In addition, Part I deals with the species of the subfamilies Tanypodinae, Diamesinae and Clunioninae and mentions the Podominae, whilst in Part II the species of the subfamilies Orthocladiinae and Corynoneurinae are described. Part III describes the species and genera of the first half of the large subfamily Chironominae, that is the genus *Chironomus* and its allies, which are the genera normally with two spurs on the posterior tibia. It is hoped to complete the subfamily Chironominae in the next Part.

Since publication of Part II, I have received collections from Dr. B. Stuckenberg, Natal Museum, which he has made both in Natal and also in Madagascar, from Dr. P. S. Corbet made in Uganda and from Dr. B. McMillan of the Nigerian Health Department. Mr. E. T. M. Reid has moved from Sudan to S. Rhodesia and has continued sending me collections from this new locality, both collected by himself and by Mr. Smithers, Agricultural Entomology Laboratory, Salisbury. I should like to thank all these gentlemen for their assistance in sending me material for study.

SUBFAMILY CHIRONOMINAE

Eyes with dorsal narrow portion (except in *Pseudochironomus* and in one or two other aberrant, non-African genera) ; male antennae plumose and with 11–14 segments, female antennae with 5–7 segments. Pronotum sometimes collar-like, but often reduced and not visible from above, postnotal furrow distinct. Anterior tibia terminating on the inner side in a " scale " which may be low and rounded or oval and more produced or it may carry a bristle-like spur (the non-African genus *Pseudochironomus* has a conspicuous spur on this tibia) ; middle and posterior tibiae normally with two apical combs composed of basally fused spinules, the tibial spurs are associated with these combs but one or both spurs may be reduced or absent, combs may be fused or separate. Anterior basitarsus at least as long as, and nearly always longer than, the tibia (L.R. more than 1). True base of M_{3+4} never present, R_{2+3} present but never connected to R_1 by a cross-vein ; costa almost always ending abruptly at tip of R_{4+5}. Male hypopygium not inverted, styles directed rigidly backwards and without terminal spine, coxites usually with two or more basal appendages (reduced and occasionally absent in *Chironomus* subg. *Cryptochironomus*).

As already pointed out in previous Parts, the majority of the species of Chironomidae from Africa south of the Sahara fall into this subfamily, a fact which is in accord with the work of entomologists in the Palaearctic Region, who have found that species of this subfamily are especially typical of warm water environments. In the Orthocladiinae (Part II) it was shown that the fauna closely resembled the Palaearctic fauna and the same is true of the Chironominae. Many of the species fall into groups which have been recognized in the Palaearctic fauna, but as might be expected, there is more variety and the emphasis is often different, that is, the commoner Palaearctic genera are not necessarily those which are the most abundant in Africa.

Kieffer was the first author to split up the old genera *Chironomus* and *Tanytarsus* and in his paper on the African Chironomidae (1921, *Ann. Soc. ent. France,* **90** : 1–56) he recognized over 70 genera, though not all with African representatives. Of the 39 genera in which he placed the African species in this and the two succeeding parts of the series, 25 are described as new. The majority of the new genera begin with one or other of the prefixes " *Kribi-* " and " *Nilo-*," depending on whether they were described from species found at Kribi in the French Cameroons or from the Nile in the southern part of the Sudan. Goetghebuer in his papers on the African Chironomidae was only able to recognize three of these new genera and he has himself added a further three. A fourth genus, *Kribioxenus* Kieffer, has been used by Goetghebuer, Edwards and Townes for some holarctic species, but, as shown below, this is incorrect and the species should really be placed in *Nilothauma* Kieffer. The recognition and re-definition or the placing in synonymy of these genera is one of the main problems of this Study.

As a primary character, Kieffer used the presence of macrotrichia on the wing membrane to split off " Groupe *Tanytarsus* " which included *Pentapedilum.* The genera with bare wings which he termed " Groupe *Chironomus* ", were divided into major groupings by the number of spurs on the posterior tibiae. Genera were then separated to a great extent on the detailed structure of the combs, spurs and pulvilli, whilst antennal segmentation of one or both sexes, male hypopygial structure and wing pattern were used as subsidiary characters. Some of these characters are trivial and certainly not of generic value, others, especially characters of pulvilli do not exist. For example, he stated that in *Cladopelma* and *Stenochironomus* the pulvilli were branched on the median side, in *Dicrotendipes* they were narrow and half as long as the claws, whilst in *Chironomus* they were large and not branched. I have made stained preparations of pulvilli of species belonging to these genera and known to Kieffer and can see no differences between the pulvilli of any of them, and I am forced to conclude that he must have examined them from different aspects or under different conditions. On the other hand he is quite correct in stating that the pulvilli in *Polypedilum* are split longitudinally.

Edwards (1929), *Trans. ent. Soc. Lond.* **77** : 279–430) has laid the foundations of the modern classification of the subfamily, but as in the Orthocladiinae, he went to the opposite extreme to Kieffer and used very large genera which he subdivided into subgenera, species groups and series. Although Edwards's main concepts of groups have been accepted by later authors, few have accepted his large genera which have been found to be unwieldy and difficult to use. One of the great difficulties in classifying the subfamily is the presence of intermediate species linking many of the groups, but even so, I think that it is possible to achieve a greater degree of subdivision than was advocated by Edwards. The classification which I am offering is probably nearer to that of Goetghebuer (1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*)), but there are a number of differences of opinion. I do not go as far as Townes (1945, *Amer. midl. Nat.* **34** : 1–206) in splitting into genera, nor do I agree with all of his radical changes in relationships.

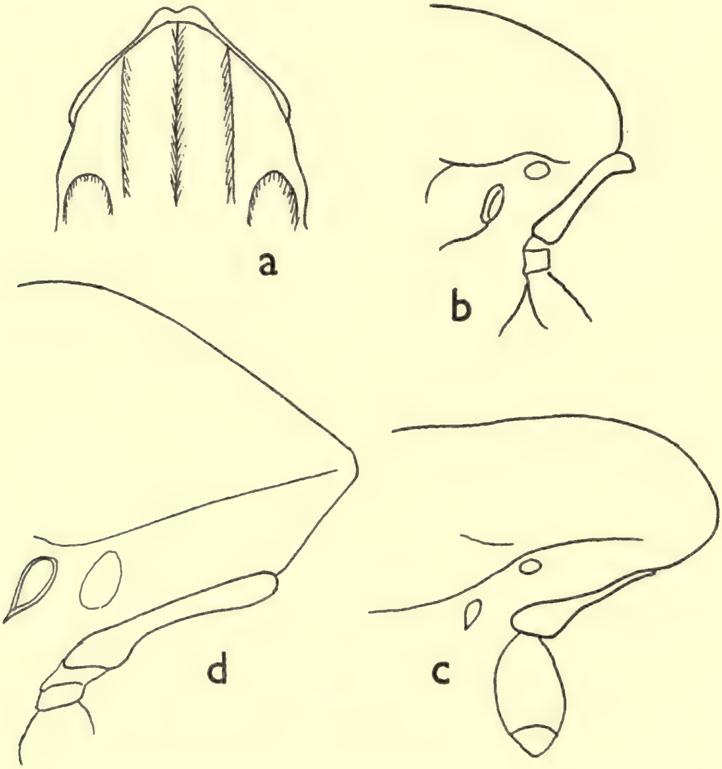

Fig. 1. Anterior halves of thoraces to show prothorax. (*a*) *Chironomus caffrarius*, dorsal view; (*b*) the same in lateral aspect; (*c*) *Stenochironomus atroconus*, lateral aspect; (*d*) *Collartiella hirsuta*, lateral aspect.

Edwards (1929) was the first author to indicate the importance to classification of the size of the prothorax and he used it as one of the main characters for splitting his large genus *Chironomus* into subgenera. Goetghebuer and Townes have both followed Edwards in the use of this character.

KEY TO TRIBES OF SUBFAMILY CHIRONOMINAE

Wing membrane without macrotrichia, or if present then squama with marginal fringe of long hairs ; cross-vein r-m definitely oblique to direction of vein R_{4+5} CHIRONOMINI

Wing membrane with macrotrichia at least towards the apex, squama without fringe ; cross-vein r-m nearly parallel to and practically continuous with R_{4+5} TANYTARSINI (= Calopsectrini of Townes) (see later part)

TRIBE CHIRONOMINI

Only one half of this tribe is dealt with in this Part, a later Part will describe species both in the other half and in the Tanytarsini.

Apart from a few small and aberrant genera, the tribe was divided by Kieffer into two groups depending on whether the posterior tibia had one or two spurs in association with the combs. This method of dividing the bulk of the species was also adopted by Edwards and Goetghebuer and for most species it is perfectly satisfactory. Genera can then be split off on the development of the prothorax, size of pulvilli and presence of front tibial spur.

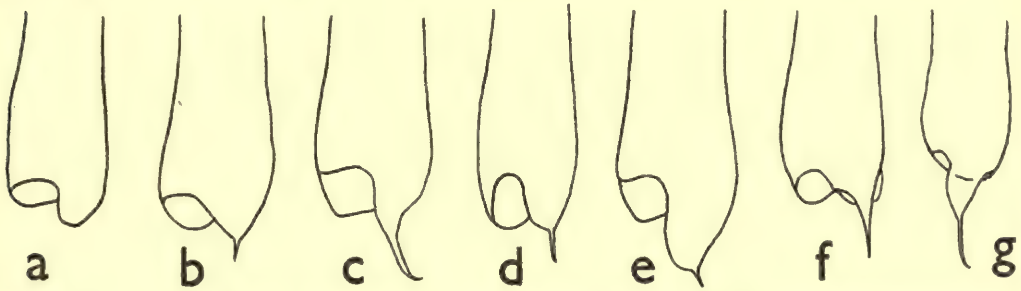

FIG. 2. Apices of anterior tibiae. (*a*) *Chironomus pulcher ;* (*b*) *C.* (*Endochironomus*) *woodi ;* (*c*) *Nilodosis fusca ;* (*d*) *Henrardia quadrispinosa ;* (*e*) *Stenochironomus atroconus ;* (*f*) *Paratendipes crosskeyi ;* (*g*) *Nilothauma pictipenne.*

However, several genera of the two-spurred group contain species in which the spurs are reduced to one or are even completely absent, but which seem otherwise to be quite typical ; also, in *Collartiella* the number of spurs may be different on the two sides of the same specimen. It might be thought advisable to choose other and more reliable characters to replace the spur number for the main division of the group, but no other character seems to divide the genera into such natural series. For instance, the great reduction of the prothorax seen in *Stenochironomus* a genus with two spurs, is also shown to some extent by *Microtendipes* which has only one spur. Other characters such as male hypopygial structure and presence of acrostichal bristles do not bear out a close relationship of the two genera and it seems more likely that the resemblance is caused by convergence.

I am therefore adopting Kieffer's original method of dividing the tribe, but I have found it to be necessary to modify some of the definitions because of the presence of species more or less intermediate between genera and because of the presence of single-spurred species in genera normally two-spurred. Further study has shown that some of the groups which I previously treated as genera cannot be considered of more than subgeneric status. Only those genera which normally have two spurs on the posterior tibiae are treated in this Part, and the key to genera covers all genera in this section ; genera dealt with in the next Part will be fully keyed there.

I have been able to identify and report on all the genera described by Kieffer and Goetghebuer falling into this section of the tribe with the exception of *Kribiobius* Kieffer. This appears to have been based on the female of a species of *Tanytarsus* and will be dealt with in Part IV.

Key to African Genera of Tribe Chironomini—Section I

(Includes genera normally with two spurs on posterior tibia)

1. Posterior tibia with two spurs, that is each comb with a spur 2

Posterior tibia either with a single spur on the small outer comb and the larger outer comb unarmed, or with neither comb spurred 10

2. Pulvilli large and indistinct 3

Pulvilli absent or indistinguishable 6

3. Prothorax reaching up to front of mesonotum, visible from above, often collar-like, sometimes divided by a suture but with the two halves touching (Text-figs. 1, *a*, *b*) *Chironomus* Meigen

Prothorax more reduced, not visible from above 4

4. Middle tibia with four spurs on outer comb (Text-fig. 14, *d*) ; mesonotum not cone-shaped . . . . *Henrardia* Goetghebuer

Middle tibia with one spur on each comb ; mesonotum cone-shaped and projecting over head (Text-figs. 1, *c*, *d*) 5

5. Mouthparts very reduced, palpi 2-segmented, body with tufts of long hair *Collartiella* Goetghebuer

Mouthparts normal, palpi with 4 segments, body without tufts of long hair *Stenochironomus* Kieffer

6. Anterior tibia without spur or spine at apex of scale 7

Anterior tibial scale armed with spur or spine 8

7. Squama bare . . . . *Paratendipes* Kieffer, in part

Squama fringed, palpi greatly reduced . *Chironomus* subg. *Halliella* Kieffer, in part

8. Prothorax greatly reduced, male antenna with last segment hardly as long as preceding 3 together . . . . *Nilothauma* Kieffer

Prothorax nearly reaching front of mesonotum, A.R. at least 0·8 and often more . 9

9. Anterior tibia with conical scale terminating in a curved spine (Text-fig. 2, *c*), male hypopygium with 2 coxite appendages . . . . *Nilodosis* Kieffer

Anterior tibial scale not projecting beyond end of tibia, spine short and straight (Text-fig. 2, *f*) ; 3 coxite appendages . . . . . . *Paratendipes* Kieffer

10. Pronotum reaching up to front of mesonotum, visible from above, although it may be narrow and with a central suture ; pulvilli large and distinct *Chironomus* Meigen, in part

Pronotum more reduced, not visible from above 11

11. Mesonotum projecting as a cone above the head, pronotum much reduced (Text-figs. 1, *c*, *d*) ; acrostichal bristles well formed and in a double row reaching back to centre of thorax 12

Mesonotum either not like this or else acrostichal bristles only present at apex of cone . . . . See Part IV

12. Mouthparts very reduced, palpi only 2-segmented ; body and femora with tufts of long hair . . . . *Collartiella* Goetghebuer

Mouthparts normal, palpi with 4 segments ; body and legs without tufts of long hair . . . . *Stenochironomus* Kieffer, in part

Genus *CHIRONOMUS* Meigen

Chironomus Meigen, 1803, *Illiger's Mag.* **2** : 260.
Halliella Kieffer, 1911, *Rec. Ind. Mus.* **6** : 172.
Dicrotendipes Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 23.
Endochironomus Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 69.
Cryptochironomus Kieffer, 1918, *Ent. Mitt.* **7** : 46.
Limnochironomus Kieffer, 1920, *Ann. Soc. sci. Brux.* **39** (1) : 166.
Xenochironomus Kieffer, 1921, *Bull. Soc. Hist. nat. Moselle,* **29** : 69.
Chironomus subgg. *Chironomus* and *Endochironomus* Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 380 and 393.
Tendipes Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*) : 18 ; Townes, 1945, *Amer. midl. Nat.* **34** : 101.

Male antenna with 12 segments (14 in some species of *Endochironomus*), and usually 6 in the female ; frontal tubercles frequently present ; palpi usually long though reduced in subgenera *Halliella* and *Nilodorum* and occasionally elsewhere. Prothorax reaching up to front of thorax where it may form a collar with or without emargination in the centre ; often with a centrally dividing suture, but the two halves are close together and not widely separated. Anterior tibia without spur (Text-fig. 2, *a*) except in a few species of *Endochironomus* (Text-fig 2, *b*), combs of middle and posterior tibia large and each with a short spur ; spurs reduced or even absent in occasional species ; pulvilli large and broad, except in one species of *Halliella*. Wing membrane without macrotrichia ; squama with complete fringe, cross-vein distinct and oblique, posterior fork below or slightly beyond cross-vein, R_{2+3} ending only a little beyond tip of R_1. Abdomen without mid-dorsal impressions.

The genus *Chironomus* as here defined includes all the species groups placed by Edwards (1929) in his subgenera *Chironomus* s. str. and *Endochironomus*. Its main characters are the size of the prothorax which reaches up to the front of the mesonotum, combined with large pulvilli and two tibial spurs. I have found it impossible to restrict definition of the genus further as was done by Townes (1945) because of intergrading and because some of the best characters for group definition lie in the male genital structures and are therefore not applicable to the female. For this reason I am discontinuing my earlier use of *Cryptochironomus*, *Dicrotendipes*, *Nilodorum* and *Endochironomus* as full genera and am considering them to be subgenera only. The advantage of this system is that whilst names are employed for groups which can normally be easily identified in one or both sexes, such as *Nilodorum*, the presence of intergrading forms is recognized by treating them as subgenera only. In addition, it is my opinion that it is essential to employ as genera, groups which can be recognized infallibly in both sexes. A fuller account of the synonymy and use of genera by different authors is given under the various subgenera.

KEY TO SUBGENERA OF *CHIRONOMUS* FROM AFRICA SOUTH OF THE SAHARA

1. Prothorax collar-like and with a well-marked V-shaped emargination in the middle ; thorax usually with lines of pruinosity along the lines of bristles ; frontal tubercles present and elongate ; male hypopygium with both appendages 1 and 2 present, appendage 2 broad and straight and with long curved hairs at the apex *Chironomus* s. str.

Prothorax usually narrower and applied to the front of the mesonotum with a centrally dividing suture, occasionally collar-like, but then at the most with a shallow central emargination ; thorax without lines of pruinosity ; frontal tubercles absent or small ; appendage 2 often racket-shaped, narrower basally, or reduced 2

2. Palpi very short, segments not more than 2–3 times as long as broad ; thorax thickly covered with grey dusting ; male appendages 1 and 2 both well developed 3

Palpi only rarely short, segments usually about 6 times as long as broad ; thorax with thin grey dusting only in a few species 4

3. Pronotum collar-like . . . . *Halliella* Kieffer

Pronotum narrow, closely applied to front of mesonotum . . *Nilodorum* Kieffer

4. Appendages 1 and 2 both well developed ; anterior tarsi with segment 5 cylindrical 5

Either appendage 1 or 2 or both reduced and rudimentary ; fifth segment of anterior tarsus flattened 6

5. Appendage 2 narrower basally and curved or bowed upwards ; male antenna always 12-segmented, female 6-segmented ; front tibiae never spurred . *Dicrotendipes* Kieffer

Appendage 2 of more even width, not curved upwards or bowed ; male antenna sometimes 14-segmented and that of female may be either 6 or 7 ; anterior tibia sometimes spurred . . . . *Endochironomus* Kieffer

6. Appendage 2 of male well formed, reaching beyond end of coxite and with curved hairs at the tip . . . . *Xenochironomus* Kieffer

Appendage 2 not reaching beyond end of coxite, without long curved hairs and often either rudimentary or absent . . . . . . *Cryptochironomus* Kieffer

Chironomus MEIGEN SUBGENUS ***Chironomus*** SENSU STRICTO

Chironomus Meigen, 1803, *Illiger's Mag.* **2** : 260 ; Kieffer, 1908, *Denkschr. Med.-Nat. Ges: Jena*, **13** : 158 ; Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 351 (in part) ; Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 14 ; Kieffer, 1914, *Ann. S. Afr. Mus.* **10** . 263 ; Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 66 (in part) ; Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 382 ; Kieffer, 1924, *ibid.* **43** (1) : 260 ; Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 197 ; Freeman, 1955, *S. Afr. Animal Life.* Uppsala **2** : 370.

Calochironomus Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 66 (in part) ; Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 383 (as subg. of *Chironomus*) ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 290 (in part).

Einfeldia Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 393.

Chironomus subg. *Chironomus* Group B Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 382.

Chironomus subgg. *Calochironomus* and *Chironomus* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 467 and 470 ; Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 17 and 18.

Chironomus subgg. *Chironomus* and *Einfeldia* Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 13 ; Freeman, 1955, *Explor. Parc Nat. Upemba*, Miss. de Witte, fasc. **35** (6) : 96–97.

Frontal tubercles present and elongate in all African species, palpi long except in *tetraleucus* ; prothorax collar-like and with central V-shaped emargination ; thorax often with pruinose lines ; male hypopygium with both appendages 1 and 2 present. Appendage 1 in the African species usually curved and bare, arising from a basal pubescent pad, but in some species the pad is extended and the curved bare part reduced (*Einfeldia* Kieffer) ; appendage 2 broad and straight, with long curved hairs at the apex ; styles in most species contracted on about apical third and with a close-set row of short stiff bristles on inner side at tip.

The subgenus *Chironomus* as used here includes species of the so-called *"plumosus"* group together with those placed by Edwards in *Einfeldia*. All the species have a large collar-like pronotum, which is centrally emarginate and have appendages 1 and 2 well developed. I am rejecting *Einfeldia* because it does not seem to be a natural group and is based on the development or otherwise of the basal pubescent pad of appendage 1, a feature not always easy to appreciate.

Seventy species from Africa south of the Sahara have been placed in *Chironomus*, 52 of them having been described by Kieffer. In addition Kieffer has described four species of *Chironomus* s. str. in *Calochironomus* and one in *Cryptochironomus*; two of those placed in *Calochironomus* (*C. oxylabis* and *nilicola*) are synonyms of *Chironomus formosipennis*, the other two (*C. niliacus* and *hexastictus*) are synonyms of *Chironomus calipterus*; *Cryptochironomus fasciatus* seems to be a synonym of *Chironomus imicola*. Tables I and II detail the species described in Chironomus and show their position in the present Study. I am recognizing 18 species in the subgenus from the Region.

TABLE I.—*Species from Africa Described by Kieffer in Chironomus*

Date	Original specific name	Position in present study
1908	*calipterus*	*Chironomus* s. str.
	formosipennis	*Chironomus* s. str.
	longicornis	See under *C.* (*C.*) *caffrarius*
	tripunctatus	*C.* (*C.*) *pulcher*
	schultzei	? mixed series; see *C.* (*C.*) *tetraleucus*
	africanus	See under *C.* (*C.*) *transvaalensis*
	apicalis	See under *C.* (*C.*) *callichirus*
	apricus	See under *C.* (*C.*) *caffrarius*
1911	*callichirus*	*Chironomus* s. str.
	scotti	*Chironomus* s. str.
	brunneicornis	*Polypedilum*
	linearis	*Chironomus* s. str.
	leptogastrus	*C.* (*C.*) *linearis*
	binotatus	subg. *Dicrotendipes*
	chloronotus	subg. *Dicrotendipes*
	melanophilus	*Polypedilum*
	seychelleanus	*C.* (*C.*) *callichirus*
	pandani	*Polypedilum*
	limnocharis	*Polypedilum*
	nocticolor	*Polypedilum*
	nigratipes	Gen. nov. see Pt. IV
1913	*taitae*	*Microtendipes*
	tavetae	*C.* (*C.*) *calipterus*
	palustris	*C.* (*C.*) *formosipennis*
	tropicalis	subg. *Cryptochironomus*
	tangae	*C.* (*C.*) *scotti*
	kikuyui	? subg. *Cryptochironomus*
	alluaudi	*Chironomus* s. str.
	nairobii	*C.* (*C.*) *pulcher*
	imicola	*Chironomus* s. str.

1914	*tetraleucus*	*Chironomus* s. str.
	iricolor	*C.* (*C.*) *formosipennis*
	caffrarius	*Chironomus* s. str.
	capensis	*C.* (*C.*) *caffrarius*
	lamprogaster	*Microtendipes*
	sensualis	*C.* (*C.*) *pulcher*
1918	*bisignatus*	*Stictochironomus*
	natalensis	*Polypedilum*
	ornatipennis	*Polypedilum*
	brevipalpis	subg. *Nilodorum*
	brevicornis	subg. *Cryptochironomus*
	guineensis	*C.* (*C.*) *scotti*
1923	(*Ann. Soc. sci. Brux.*)	
	pictiventris	*C.* (*C.*) *formosipennis*
	rostratiforceps	*C.* (*C.*) *linearis*
	latilobus	subg. *Dicrotendipes*
	biclavatus	*C.* (*C.*) *tetraleucus*
	leucochlorus	*Chironomus* s. str.
	transvaalensis	*Chironomus* s. str.
	peringueyi	*Chironomus* s. str.
1923	(*Ann. Soc. ent. Fr.*)	
	niligenus	subg. *Cryptochironomus*
	niloticus	subg. *Dicrotendipes*
1924	*albomarginatus*	*C.* (*C.*) *callichirus*

TABLE II.—*Species from Africa Described in Chironomus by Authors other than Kieffer*

Author and date	Original name	Position in present study
Wiedemann, 1830	*pulcher*	*Chironomus* s. str.
Goetghebuer, 1934	*palpalis*	*C.* (*C.*) *imicola*
Goetghebuer, 1936	*bellus*	*C.* (*C.*) *scotti*
	bipustulatus	*Stenochironomus*
	bredoi	subg. *Dicrotendipes*
	caligans	*C.* (*Nilodorum*) *fractilobus*
	congolensis	*Chironomus* s. str.
	duboisi	*C.* (*C.*) *scotti*
	henrardi	subg. *Dicrotendipes*
	reginae	*C.* (*C.*) *imicola*
	schwetzi	*C.* (*C.*) *pulcher*
	seydeli	*Chironomus* s. str.
	surdellus	*C.* (*Nilodorum*) *brevipalpis*
	vaneyeni	*C.* (*C.*) *scotti*
	vitshumbiensis	*C.* (*Nilodorum*) *brevipalpis*
Freeman, 1954	*nivalis*	*C.* (*C.*) *callichirus*
	brunneus	*Chironomus* s. str.
Freeman, 1955	*rostrifer*	*C.* (*C.*) *seydeli*

KEY TO AFRICAN SPECIES OF *Chironomus* S. STR., BASED MAINLY ON MALE CHARACTERS

1. Wings with distinct clouds, especially in cell R_{4+5} 2
Wings without clouds, at most faintly iridescent in anal and fork cells 3
2. Large species, wing length 3·5–5·5 mm., abdomen with elongate or oval black spot on at least segments 2–4, wing as in Pl. 1, fig. *b* . . . . *formosipennis* Kieffer
Small species, wing length 2·5 mm., abdomen yellowish-brown and without distinct markings, wings as in Pl. 1, fig. *a* . . . . *calipterus* Kieffer
3. Abdomen with segments 1–6 plain green, without any trace of dark markings 4
Abdomen with at least a trace of dark markings on at least segments 2–4 5
4. Wing length about 3·5 mm., prothorax larger than usual, male hypopygium as in Text-fig. 3, a . . . . *scotti* Kieffer
Wing length 3·0 mm., prothorax normal, male hypopygium (Text-fig. 4, *a*) highly characteristic . . . . *acuminatus* sp n.
5. Anterior tarsi of male with distinct and often strong beard composed of long hairs 6
Beard absent 9
6. Anterior tarsal beard strong and bushy 7
Beard weak 8
7. Legs not thicker than usual, abdomen of male with definite spots, hypopygium as in Text-figs. 3, *f*, *o* . . . . *caffrarius* Kieffer
Legs thick, abdomen almost completely dark, male hypopygium as in Text-figs. 4, *d*, *i* . . . . *tetraleucus* Kieffer
8. Abdomen mainly blackish . . . . *brunneus* Freeman
Abdomen green with black spots on segments 1–5 . . . . *alluaudi* Kieffer
9. Anal point short, broad and downturned, female femora blackened apically 10
Anal point narrow, longer and not strongly downturned 11
10. Anal point rounded at apex in side view (Text-fig. 4, *g*), wing length 3–3·5 mm. *imicola* Kieffer
Anal point pointed at apex in side view (Text-fig. 4, *h*), wing length 5·0 mm. *seydeli* Goetghebuer
11. Legs distinctly darkened at the knees or apices of femora or bases of tibiae 12
Legs without these dark markings 13
12. Thorax with an extra pruinose line along lateral stripe, wing length 3·5–4 mm. *callichirus* Kieffer
Lateral stripes without line of pruinosity, wing length 2·5 mm. . . . . *linearis* Kieffer
13. Anterior femora one and a half times as long as tibiae, small dark species, wing length 2·5 mm. . . . . *congolensis* Goetghebuer
Anterior femora at most one and a quarter times as long as tibiae 14
14. Anal point deep at base in side view (Text-figs. 3, *m*, *n*) 15
Anal point of more even width (Text-figs. 3, *j*, *l*,) 16
15. Male hypopygium as in Text-figs. 3, *e*, *n*, anal point shorter and more downturned *transvaalensis* Kieffer
Male hypopygium as in Text-figs. 3, *d*, *m*, anal point longer and straighter, appendage 2 narrower . . . . *leucochlorus* Kieffer
16. Anal point bent in side view and blunt ended (Text-fig. 3, *j*), appendage 2 with fewer hairs 17
Anal point less bent (Text-fig. 3, *l*), appendage 2 with more hairs, segment 6 of female antenna without long sensory hairs . . . . *satchelli* sp n.
17. Segment 6 of female antenna with about 8 long sensory hairs, each two-thirds length of segment . . . . *pulcher* Wiedemann
Segment 6 of female antenna with normal sensory hairs, each about a quarter or one-third length of segment . . . . *peringueyi* Kieffer

Chironomus (Chironomus) pulcher Wiedemann

Chironomus pulcher Wiedemann, 1830, *Aussereurop. Zweifl. Ins.* **2** : 615.
Chironomus tripunctatus Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena*, **13** : 160 (SYN. NOV.).
Chironomus nairobii Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 19 ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 14 (SYN. NOV)..
Chironomus sensualis Kieffer, 1914, *Ann. S. Afr. Mus.* **10** : 267 ; Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 17 ; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 370 (SYN. NOV.).
Chironomus schwetzi Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **27** : 476 (SYN. NOV).

Although I have not seen the types of *pulcher* and *tripunctatus*, the descriptions leave little doubt that they are earlier descriptions of the species to which I have previously referred as *sensualis*. My earlier identification of *nairobii* as a distinct species is incorrect and I am now satisfied that this is a synonym of *pulcher*. Typical South African males have the styles strongly constricted and appendage 2 fairly long ; specimens from Central and West Africa have the styles less constricted and appendage 2 shorter and were described by Goetghebuer as a distinct species *schwetzi*. It is possible to find intermediates and specimens occur in which the styles are strongly constricted and appendage 2 is short and vice versa. There does not seem to be a well-defined area of overlap and I am forced to regard *schwetzi* as a synonym instead of a geographical race.

Green with reddish scutal stripes and dark spots on abdominal segments, wings unmarked, anterior tarsi without beard, anterior tibiae hardly shorter than femora. Very similar to a number of other species but readily distinguished if females are present by the extraordinarily long sense bristles on the sixth antennal segment, each being about two-thirds length of segment. Male hypopygium with anal point narrow, blunt-ended and curved in side view, appendage 2 with only about 11–12 curved hairs.

Male. Wing length 3–3·75 mm.

Head greenish-yellow, palpi dark, pedicel reddish, A.R. about 3, frontal tubercles present. *Thorax* green or yellowish ; stripes, apex of postnotum and sternopleuron reddish-yellow ; prothorax of normal size, dorso-central hairs pale, irregularly biserial, uniserial posteriorly ; pruinose on shoulders, along lateral margins and lines of bristles, with a break between pruinosity on shoulders and that along line of dorso-central bristles. *Legs* yellowish-green, tarsal segments darker at apices, L.R. about 1·5, anterior tibia almost subequal to femur. *Wings* unmarked except for slight darkening at cross-vein, halteres pale. *Abdomen* green or yellowish with dark markings : segment 1 usually plain, segments 2–4 with a central, more or less round blackish spot variable in size and intensity, 5–7 more generally dark, at least in dried specimens, and usually conspicuously pruinose. Hypopygium (Text-figs. 3, *a*, *j*) in typical South African specimens with styles very sharply constricted at about the middle, basal half broader than in other species, appendage 2 with only about 11–12 curved hairs, anal point rather longer than appendage 2, blunt-ended and curved in side view ; in specimens from Central and West Africa there is a tendency for the styles to be much less strongly constricted and for appendage 2 to be shorter (see above).

Female resembles male but abdomen tends to be darker in dried specimens; antennae quite characteristic, segments 2–5 with long narrow necks, neck as long as basal portion in segments 3–5, hairs of hair whorls twice as long as segments, segment 6 one and a half times as long as 5 and with about 8 long curved sense hairs, each being two-thirds length of segment.

I have seen males of the type series of *nairobii* which are in Muséum National d'Histoire Naturelle, Paris (type locality, Kenya: Kyambu, St. Benoit); females from the type series of *sensualis* which are in South African Museum, Cape Town (locality, Cape Town); and the holotype male of *schwetzi* in Musée Royal du Congo Belge, Tervuren (locality, BELGIAN CONGO: Kabinda). Type locality of *pulcher* "Cape", of *tripunctatus* S.W. AFRICA: Rooibank.

DISTRIBUTION. Common and widely distributed; I have seen specimens from: Cape Province, Natal, Transvaal, S. Rhodesia, Nyasaland, Belgian Congo (Elisabethville, Kabinda and Ruanda Urundi), Uganda, Kenya, Nigeria, Dahomey, Gold Coast, Haute Volta, Sierra Leone, Gambia, Madagascar (Perinet).

Chironomus (Chironomus) scotti Kieffer

Chironomus scotti Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14**: 352.
Chironomus tangae Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1**: 18 (SYN. NOV.).
Chironomus guineensis Kieffer, 1918, *Ann. Mus. nat. Hung.* **16**: 71 (SYN. NOV.).
Chironomus bellus Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **27**: 472 (SYN. NOV.).
Chironomus duboisi Goetghebuer, 1936, *ibid.* 475 (SYN. NOV.).
Chironomus vaneyeni Goetghebuer, 1936, *ibid.* 478 (SYN. NOV.).

The male of this species differs from *pulcher* only by there being no dark spots on segments 2–4 of the abdomen and by the prothorax often appearing larger than usual. In the female dark spots can be distinguished on the abdomen in a well-preserved specimen, but it may be separated from *pulcher* by the structure of the last antennal segment which is dark, equal to segments 3–5 together and bears well-developed but not long sensory hairs. In all other respects, including the male hypopygium, the two species are identical.

Part of the type series of *scotti* is in the British Museum. I select the single male as lectotype, type locality SEYCHELLES: Mahé. I have seen the type of *tangae* which is in Muséum National d'Histoire Naturelle, Paris (locality, TANGANYIKA: Tanga). The types of Goetghebuer's species are all in Musée Royal du Congo Belge, Tervuren, where I have been able to examine them; type locality of *bellus* BELGIAN CONGO: Rutshuru and Kabasha, of *duboisi* Léopoldville, of *vaneyeni* Bas-Congo, Lemfu. The type of *guineensis* is probably lost, locality, FRENCH GUINEA: Mamon. Although the type locality is Seychelles, there seems to be no point of difference between these specimens and mainland ones; the differences mentioned by Goetghebuer are trivial and subject to variation and I am therefore regarding all as synonyms of the earliest name.

DISTRIBUTION. It has a wide distribution and I have seen specimens from: Seychelles, Transvaal, Nyasaland, Angola, Belgian Congo, French Cameroons, Nigeria, Gold Coast, Haute Volta, Kenya, Sudan, Ethiopia.

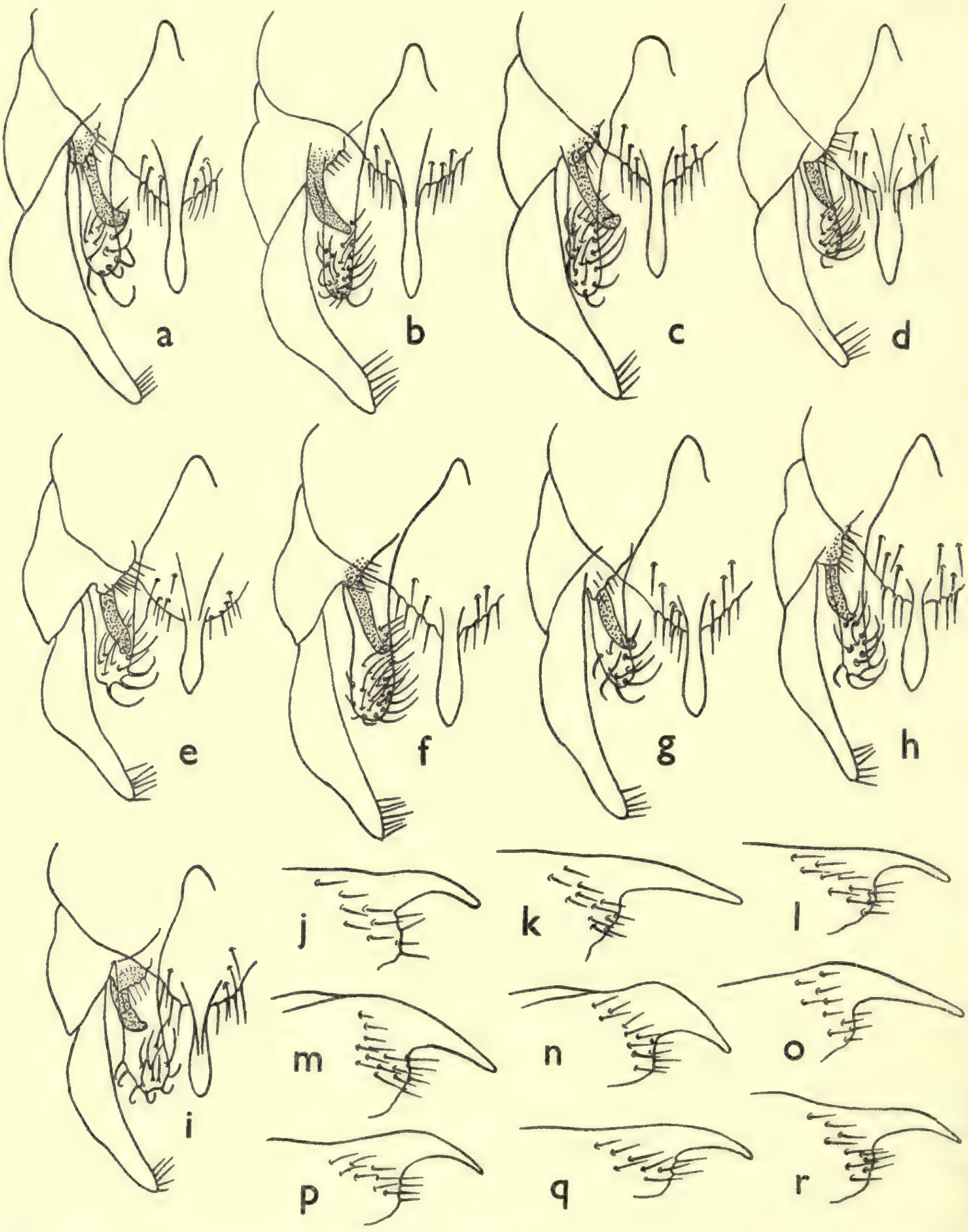

FIG. 3. Male hypopygia of *Chironomus* subg. *Chironomus* ; (*a*)–(*i*) in dorsal aspect, (*j*)–(*r*) anal point in lateral aspect. (*a*) *C. pulcher* ; (*b*) *C. alluaudi* ; (*c*) *C. satchelli* ; (*d*) *C. leucochlorus* ; (*e*) *C. transvaalensis* ; (*f*) *C. caffrarius* ; (*g*) *C. callichirus* ; (*h*) *C. congolensis* ; (*i*) *C. linearis* ; (*j*) *C. pulcher* ; (*k*) *C. alluaudi* ; (*l*) *C. satchelli* ; (*m*) *C. leucochlorus* ; (*n*) *C. transvaalensis* ; (*o*) *C. caffrarius* ; (*p*) *C. callichirus* ; (*q*) *C. congolensis* ; (*r*) *C. linearis*.

Chironomus (Chironomus) peringueyi Kieffer

Chironomus peringueyi Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 386.

I have seen the holotype female of this species which is in South African Museum. It is very similar to *scotti* in antennal structure, colour and general appearance; the abdomen has dark spots on segments 2–4. A series from French Cameroons and another from Tanganyika with females closely resembling the type have males indistinguishable from *pulcher*. Until more material can be collected in the type locality and the limits of the species more fully understood, I am regarding the species as distinct. The wing length of specimens known to me is 2·75–3 mm.

The type locality " Marley " quoted by Kieffer is the collector's name; the true locality on the holotype is Krautz Kloof (near Durban).

DISTRIBUTION. NATAL : Krautz Kloof. TRANSVAAL : 5 ♀, Waterval, Lydenburg Distr., iv.1955 (*A. D. Harrison*). S. RHODESIA : 1 ♀, Salisbury, iii.1900 (*G. A. K. Marshall*). TANGANYIKA : 5 ♂, 1 ♀, Matengo, Ugano, i.1936 (*Zerny*). FRENCH CAMEROONS : 4 ♂, 1 ♀, Yaoundé, ix.1952 (*J. Rageau*).

Chironomus (Chironomus) alluaudi Kieffer

Chironomus alluaudi Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 19.

Yellowish-green, thoracic markings reddish-yellow, abdomen with dark spots on segments 1–5 or 6, cross-vein blackened, frontal tubercles present, pruinosity on thorax similar to *pulcher*, male front tarsi with slight beard. Female antennae with last segment equal to previous two together, male hypopygium with anal point straighter than in *pulcher*, style less strongly constricted and appendage 2 with more hair.

Male. Wing length 3·5 mm.

Head yellowish, mouthparts dark, A.R. about 3, pedicel brown, small frontal tubercles present. *Thorax* with greenish-yellow background; stripes, apex of postnotum and sternopleuron reddish-yellow; dorso-central bristles rather long, uniserial and pale; pruinosity well developed along lines of hairs, in prescutellar area, on shoulders and along lateral margins, with a distinct break between that on shoulders and that along dorso-central hair line. *Legs* yellow, tips of tarsal segments dark, anterior tibia and femur subequal, anterior tarsus with thin beard formed of long hairs, L.R. about 1·6. *Wings* with veins more or less seamed with light greyish, cross-vein dark, halteres yellow. *Abdomen* yellowish-green, segment 1 with trace of darkening, segments 2–5 or 6 with central dark spot, more or less extended laterally, apical segments darker. Hypopygium (Text-figs. 3, *b*, *k*) with anal point straighter in side view than *pulcher*, styles curved and not strongly constricted, appendage 2 with more numerous hairs.

Female resembles male, although abdomen may be darker in dried specimens. Segments 3–5 of antennae with well-formed necks, segment 6 equal to 4 and 5 together, sense bristles normal, not as long as in *pulcher*.

I have seen the type series of both sexes which is in Muséum National d'Histoire Naturelle, Paris (type locality, KENYA: Naivasha).

DISTRIBUTION. Apart from the type series, I have seen: KENYA: 6 ♂, 1 ♀, Nairobi, iv.1912 (*T. J. Anderson*).

Chironomus (Chironomus) satchelli sp. n.

A fairly large greenish species with reddish thoracic markings and black abdominal spots. Prothorax large, tarsal beard absent, thoracic pruinosity not well marked, female antennae with last segment equal to 3–5 together. Distinguished from *pulcher* and others by the more numerous hairs on appendage 2 of male hypopygium and from *alluaudi* by the wider styles and absence of tarsal beard.

Male. Wing length 4·5–5 mm.

Head green, frontal tubercles present, mouthparts darkened, pedicel reddish-yellow, A.R. about 3. *Thorax* green, stripes, apex of postnotum and sternopleuron reddish-yellow; pruinose on shoulders, lateral margins and along hair lines, but pruinosity much less developed than in *pulcher*; dorso-central hairs pale and uniserial; prothorax larger than in *pulcher*, more as in *scotti*. *Legs* yellowish-green, apices of tarsal segments darkened, L.R. 1·5, beard absent, anterior tibia slightly shorter than femur. *Wings* unmarked except for cross-vein which is slightly darkened, halteres pale or greenish. *Abdomen* green, segment 1 obscurely darkened, 2–6 with a large black spot usually extended laterally to the margins, apical segments more generally darkened. Hypopygium (Text-figs. 3, *c*, *l*) with styles strongly contracted at apex as in *pulcher*, anal point long and curved in side view, appendage 2 about as long as anal point and with about 20 hairs.

Female shows a general resemblance to male, although abdomen rather darker. Antennae with segment 6 equal to 3–5 together, sense hairs on 6 short and curved.

Holotype male and 2 ♀ paratypes, CAPE PROVINCE: Transkei, Kokstad, Mt. Currie, iii.1953 (*G. H. Satchell*). Further paratypes: CAPE PROVINCE: 1 ♂, Kirstenbosch, xii.1952 (*K. M. F. Scott*); 1 ♂, Grahamstown, ii.1953 (*G. H. Satchell*). TRANSVAAL: 1 ♂, 1 ♀, Tzaneen, Magoeba's Kloof, v.1953 (*G. H. Satchell*); 1 ♂, 1 ♀, Sabie-Pilgrims' Rest Road, ix.1954 (*A. D. Harrison*); 3 ♂, Waterval, Lydenburg District, iv.1955 (*A. D. Harrison*). UGANDA: 1 ♂, N. Bugishu, i.1930 (*H. Hargreaves*); 1 ♂, Kigezi Province, Mt. Sabinio, 10–11,000 ft., xi.1934 (*F. W. Edwards*). Three paratypes placed in South African Museum, holotype and remainder of paratypes in British Museum.

Chironomus (Chironomus) leucochlorus Kieffer

Chironomus leucochlorus Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 383.

In general appearance, colour and structure very similar to *satchelli* and *transvaalensis*. Southern African specimens may be pale but the Sudanese specimens are darker and well marked; distinguished from *satchelli* by smaller prothorax, structure of male hypopygium and female antennae, from *transvaalensis* by the hypopygial structure.

Male hypopygium (Text-figs. 3, *d*, *m*) with comparatively narrow styles, appendage 2 rather short and narrow, anal point broad and in side view deep at the base and characteristically bent downwards, apex not curved. Female antennae with segment 6 hardly as long as 4 and 5 together.

I have seen the holotype male which is in South African Museum, Cape Town (type locality, Durban).

DISTRIBUTION. NATAL: Durban. S. RHODESIA: 1 ♂, 1 ♀, Salisbury, ii–iv.1900 (*G. A. K. Marshall*). BELGIAN CONGO: 1 ♂, Kalondo (Kivu), viii.1935 (*H. Damas*). SUDAN: 5 ♂, 1 ♀, Kelling, Jebel Marra, i.1954 (*D. J. Lewis*).

Chironomus (Chironomus) transvaalensis Kieffer

Chironomus transvaalensis Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 386.
? *Chironomus africanus* Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena,* **13** : 162.

Almost identical to *leucochlorus* except for male hypopygium in which the anal point is much more sharply downturned (Text-figs. 3, *e*, *n*), appendage 2 is also rather broader.

I have seen the type female which is in South African Museum, Cape Town (type locality TRANSVAAL: Maboki, Lydenburg). In this and in other specimens, especially females, the thoracic stripes are darkened near the centre of the thorax giving a slightly cross-banded appearance. The shape of the anal point seems to be quite constant over the whole range.

C. africanus was described from females from S. W. AFRICA: Rooibank; the type series is probably lost. It seems likely to be an earlier description of *transvaalensis* but it is not possible to be certain without either more collecting in the type locality or examination of the type series.

DISTRIBUTION. S. W. AFRICA: 1 ♂, Windhoek, i.1934 (*K. Jordan*). TRANSVAAL: 1 ♂, 1 ♀, Johannesburg, iii.1930 (*B. de Meillon*); 3 ♂, 6 ♀, Pretoria, ix.1954 (*A. D. Harrison*). S. RHODESIA: 3 ♂, 2 ♀, Salisbury, ii–iv.1956 (*E. T. M. Reid*). PORTUGUESE EAST AFRICA: 1 ♀, Beira, vi.1932 (*A. Mackie*). BELGIAN CONGO: 2 ♂, Elisabethville, xii.1938 (*H. J. Brédo*); 2 ♂, Maka Lualaba, i.1939 (*H. J. Brédo*); 8 ♂, 4 ♀, Musosa, x.1939 (*H. J. Brédo*); 3 ♂, Mabwe, Lac Upemba, viii.1947 (*H. Damas*); 10 ♂, Albertville, Lac Tanganyika, viii.1953 (*J. Verbeke*). SUDAN: 2 ♀, Juba, vi–vii.1954 (*E. T. M. Reid*). NIGERIA: 1 ♂, Zungeru, iii.1911 (*J. W. S. Macfie*). GOLD COAST: 4 ♂, Accra, vi–vii.1916 (*J. W. S. Macfie*); 1 ♀, Nangodi, Red Volta, x.1954 (*G. Crisp*).

Chironomus (Chironomus) caffrarius Kieffer

(? *Chironomus longicornis* Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena,* **13** : 160.)
(? *Chironomus apricus* Kieffer, 1908, *ibid.* : 162.)
Chironomus caffrarius Kieffer, 1914, *Ann. S. Afr. Mus.* **10** : 265.
Chironomus capensis Kieffer, 1914, *ibid.* : 266 (SYN. NOV.).
Chironomus brunneus Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 14 (*nec* Freeman, 1954).

Antennal ratio about 5, thorax with grey dusting over whole mesonotum except shoulders, tarsi with segments 2–5 blackish, anterior tarsi heavily bearded, male abdomen with large dark spots placed basally on the segments, anal point long, straight and downcurved.

This species is readily recognized because of the grey dusting and heavily bearded male front tarsi; both sexes may also be distinguished from others by the darkening of the tarsi, although it is very similar to *brunneus* in this respect. I have seen type specimens of both *caffrarius* and *capensis* which are in South African Museum; *capensis* was described from a rather more reddish specimen. As mentioned under *formosipennis*, a female specimen labelled as one of the type series of *capensis* bears no data label and is a specimen of *formosipennis*.

C. longicornis and *apricus* which were both described from females, may be earlier descriptions of this species, but it is not possible to be certain from the descriptions. The types appear to be lost, but further collecting in the type localities may produce material which will show the exact identity of the two species.

Male. Wing length 4·5–5·0 mm.

Head greenish or yellowish-brown, mouthparts darker, frontal tubercles present, pedicel and flagellum brown, A.R. high, between 4 and 5. *Thorax* grey dusted except on shoulders which are greenish; stripes, postnotum and sternopleuron either dark brown or reddish-brown, stripes easily visible through the dusting, intervening areas more yellowish; dorso-central hairs long, pale and uniserial, pronotum not unusually large. *Legs* yellowish-green, tarsal segments 2–5 blackish, especially in South African specimens; apical half of anterior basitarsus, segment 2 and basal half of segment 3 with strong beard; L.R. low, about 1·3 or 1·4. *Wings* unmarked except for cross-vein which is slightly darkened, halteres greenish. *Abdomen* yellowish-green with an interrupted longitudinal dark fascia, spreading laterally on each segment especially at the base of each. Hypopygium (Text-figs. 3, *f*, *o*) with styles not as sharply contracted as in some species, appendage 2 with numerous hairs, anal point long, straight and slightly bent down in side view.

Female quite similar to male, although abdomen more uniformly darkened at least in dried specimens, anterior tarsal beard absent. Antennae with segments 3–5 shorter and with shorter necks than *pulcher*, segment 6 equal to 3–5 together.

Type locality of *caffrarius*, Cape Town; of *capensis*, Dunbrody; of *longicornis*, S. W. AFRICA: Rooibank; of *apricus*, Namaqualand, Steinkopf and S. W. AFRICA: Rooibank.

DISTRIBUTION. It is a common species in South Africa and I have seen numerous specimens from localities in Cape Province, Orange Free State, Natal, Basutoland, S. W. Africa and Transvaal. Additional records are from BELGIAN CONGO: Series of both sexes, Parc National Albert, Lac Magera, ii–iii.1934 (*G. F. de Witte*). ETHIOPIA: 1 ♂, Dessie, xii.35–i.1936; 1 ♂, Waldia, ii.1936 ; 1 ♂, Addis Ababa, iv.1936 (all coll. *J. W. S. Macfie*); 1 ♀, Aba, vii.1953 (*M. Ovazza*).

Chironomus (Chironomus) brunneus Freeman

Chironomus brunneus Freeman, 1954, *Proc. R. Ent. Soc. Lond.* (B) **23** : 18.

In structure, including the male hypopygium, this species is inseparable from *caffrarius*, except for the reduction of the male tarsal beard which is very sparse. It is darker in colour and lacks the grey dusting on the thorax. The thoracic markings are dark brown and the male abdomen almost entirely brown except for the pale apices of the segments. Last antennal segment of female only equal to preceding two together.

Holotype male in British Museum, type locality CAPE PROVINCE: Kirstenbosch.

DISTRIBUTION. CAPE PROVINCE: Kirstenbosch, type series and other specimens; 2 ♂, Berg R., Assegaibos, xii.1952; 1 ♂, Tokai Forest Reserve, i.1952; 1 ♀, Tulbagh Barrage, x.1953 (all coll. *K. M. F. Scott*). Specimens from Belgian Congo identified by me as this species in 1955 are now seen to belong to *caffrarius*.

Chironomus (Chironomus) callichirus Kieffer

(? *Chironomus apicalis* Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena*, **13** : 162.)
Chironomus callichirus Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 352.
Chironomus seychelleanus Kieffer, 1911, *ibid.* : 356 (SYN. NOV.).
Chironomus albomarginatus Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 260; Freeman, 1955, *S. Afri. Animal Life.* Uppsala, **2** : 370 (SYN. NOV.).
Chironomus nivalis Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 17; Freeman, 1955, *Explor. P.N.A.*, Miss. de Witte (1933–35), fasc. **83** : 13.

Thorax with brown markings and distinctive pruinose pattern, legs darkened at the knees, abdomen of male with large black spots.

The pruinose pattern of the thorax, especially the extra line on the lateral stripes, combined with the dark knees make this one of the more easily recognized of the African species. The single female type specimen in the British Museum of *callichirus* from Mahé, Seychelles is exactly similar to mainland specimens. *C. seychelleanus* was described from a mixed series, the female being *Chironomus* (*Dicrotendipes*) *binotatus* Kieffer; I now fix the male in the British Museum as lectotype. There is no real difference between this specimen and *callichirus* and it must fall as a synonym. I have seen the type of *albomarginatus* and it agrees perfectly with *callichirus*. *C. apicalis* was described from a male from Rooibank, S. W. Africa and the type is probably lost. The dark tips to the femora suggest that it is an earlier description of this species but it is not possible to be certain without either more collecting in the type locality or re-discovery of the type specimen.

Male. Wing length 3·5–4·0 mm.

Head yellowish, face darker, mouthparts brown, frontal tubercles well formed, pedicel brown, A.R. about 3. *Thorax* yellowish-green and pruinose, stripes, postnotum and sternopleuron reddish-brown; pruinosity highly characteristic, best viewed from the front: two anterior diagonal lines on shoulders, the lines of acrostichal and dorso-central bristles, a line dividing each lateral stripe longitudinally and a spot each side at the middle of the central stripe are all strongly pruinose. *Legs* yellowish-green, apices of tibiae and tarsal segments brown, knees brown or with a band just above and just below, sometimes basal third of anterior tibia dark; L.R. 1·5–1·75; tarsal beard absent. *Wings* with darkened cross-vein; halteres greenish. *Abdomen* greenish, segments 1–4 with dark markings; on 1 more or less transverse or even absent, on 2–4 as a median dark band occupying the basal three-quarters with lateral expansions to the margins, 5–8 more or less totally dark. Hypopygium (Text-figs. 3, *g*, *p*) with fairly narrow styles, appendage 2 with about 12 hairs, anal point curved in side view, basal portion more or less parallel-sided.

Female with pruinose pattern similar to male, abdomen darker. Antennal segments 3–5 with necks as long as basal portions, segment 6 twice as long as 5, sensory hairs normal.

Holotype female of *callichirus* and lectotype male of *seychelleanus* both in British Museum (type localities, SEYCHELLES: Mahé); the female type of *albomarginatus* is in South African Museum (locality, "Cape"); holotype male of *nivalis* is in British Museum (locality, CAPE PROVINCE: Bergvliet).

DISTRIBUTION. Common and widely distributed in East and South Africa. I have records from Cape Province, Natal, S. W. Africa, Transvaal, S. Rhodesia, N. Rhodesia, Nyasaland, Tanganyika, Belgian Congo (Elisabethville and Parc National Albert), Kenya, Uganda, Sudan, Ethiopia, Seychelles, Madagascar (Tananarive and Perinet). In addition, I have seen: FRENCH WEST AFRICA: 1 ♂, 1 ♀, Haute Volta, Bobo Dioulasso, ix.1956 (*J. Hamon*).

Chironomus (Chironomus) congolensis Goetghebuer

Chironomus congolensis Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 474.

A fairly small species, thorax pale with brown markings, pruinosity moderate, abdomen mostly dark in both sexes; anterior femur one and a half times as long as tibia, L.R. 2; male hypopygium not unlike *callichirus*. Distinguished from other species by short anterior tibia, unmarked wings, pale thorax and narrow styles.

Male. Wing length 2·5 mm.

Head yellowish, mouthparts darker, small frontal tubercles present, pedicel yellowish-brown, A.R. about 3·5. *Thorax* greenish-yellow; stripes, postnotum and sternopleuron light or dark brown, pruinosity present on shoulders and along lines of bristles but not particularly striking; dorso-central bristles more or less biserial. *Legs* yellowish, knees hardly darker, anterior femur one and a half times as long as tibia, L.R. 2, front legs about twice as long as entire insect. *Wings* clear, cross-vein only vaguely darkened, halteres pale. *Abdomen* may be yellowish with large dark spots occupying most of the segments or the spots may be so extended that abdomen appears dark with pale bands at the incisures. Hypopygium (Text-figs. 3, *h*, *q*) with narrow styles, appendage 2 carrying about 12 hairs, anal point evenly curved in side view.

Female resembles male, abdomen dark. Segments 3–5 of antenna with well-developed necks and whorls of long bristles, each about three times length of segment, segment 6 as long as 3–5 together.

I have seen the holotype male which is in Musée Royal du Congo Belge (locality, BELGIAN CONGO: Eala).

DISTRIBUTION. CAPE PROVINCE: 1 ♂, Ceres, iv.1925 (*R. E. Turner*). NATAL: 1 ♂, Richard's Bay, vii.1930 (*B. de Meillon*). ANGOLA: 1 ♂, San Salvador (*M. Gamble*). BELGIAN CONGO: 3 ♂, Elisabethville (*H. J. Brédo*); 1 ♂, Coquilhatville, x.1910 (*A. Y. Massey*); 5 ♂, Eala (*J. Ghesquière*); 2 ♂, 2 ♀, Basoko, iv.1948 (*P. L. G. Benoit*). KENYA: 1 ♂, Nairobi, iv.1912 (*T. J. Anderson*). UGANDA:

3 ♂, Kampala, ix.1931 (*T. W. Chorley*); 3 ♂, Semliki Forest, viii.1952 (*D. S. Fletcher*). SUDAN: 1 ♂, Tonga, xi.1953 (*E. T. M. Reid*). NIGERIA: 5 ♂, 11 ♀, Onitsha (*D. Anderson*). DAHOMEY: 1 ♂, Kandi, vi.1954 (*J. Hamon*). GOLD COAST: 3 ♂, 2 ♀, Kumasi (*W. Smith*). HAUTE VOLTA: 1 ♂, Bobo Dioulasso, ix.1954 and 4 ♂, 7 ♀, ix.1956 (*J. Hamon*). SIERRA LEONE: 1 ♂, 1 ♀, Farangbaia, xi.1955 (*D. J. Lewis*).

Chironomus (Chironomus) linearis Kieffer

Chironomus linearis Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 353.
Chironomus leptogastrus Kieffer, 1911, *ibid.* : 354 (SYN. NOV.).
Chironomus (*Calochironomus*) *rostratiforceps* Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 383 (SYN. NOV.).

Kieffer distinguished *linearis* and *leptogastrus* by the colour of the mesonotal stripes, whether they were reddish or dark brown and by the antennal ratio which was 2 or 3. Examination of type specimens in the British Museum has shown that these differences do not exist. The type of *rostratiforceps* has been borrowed from the South African Museum and has been found to belong to the same species.

The species is extremely similar to *congolensis* in colour and structure but may be distinguished by the dark apices of the femora and bases of the tibiae, especially the front tibiae which have the basal half dark. Leg proportions as in *congolensis*, A.R. about 3, male anal point in side view perhaps more parallel-sided basally (Text-figs. 3, *i*, *r*), segment 6 of female antenna shorter than 4 and 5 together. The pruinose bands along lines of dorso-central bristles often seem to be wider than in *congolensis*. The wing reflections mentioned by Kieffer under *rostratiforceps* do not differ from those of other species.

Type localities of *linearis* and *leptogastrus*, SEYCHELLES: Mahé; of *rostratiforceps* TRANSVAAL: Lydenburg.

DISTRIBUTION. TRANSVAAL: 3 ♂, 2 ♀, nr. Johannesburg, ix.1954 and iv.1955 (*A. D. Harrison*). S. RHODESIA: 1 ♂, Salisbury, iii.1900 (*G. A. K. Marshall*). SEYCHELLES: Mahé.

Chironomus (Chironomus) calipterus Kieffer

Chironomus calipterus Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena*, **13** : 158; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 371.
Chironomus tavetae Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 15 (SYN. NOV.).
Calochironomus niliacus Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 70 (SYN. NOV.).
Calochironomus hexastictus Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 292 (SYN. NOV.).

Structurally this species is very similar to *congolensis* but it is easily separated by the pale abdomen and well-developed grey clouds and seams on the wings; male also with slight tarsal beard.

The original descriptions of *calipterus*, *niliacus* and *hexastictus* leave no doubt about their identity although the types of all are lost. I have seen the type series of *tavetae* in Muséum National d'Histoire Naturelle, Paris, and can confirm that it belongs here.

Male. Wing length 2·5 mm.

Head yellowish-brown, mouth parts dark, pedicel reddish-brown, A.R. nearly 4, frontal tubercles present. *Thorax* greenish yellow with the mesonotal stripes, sternopleuron and apex of postnotum reddish or pale brown; lines of dorso-central bristles, prescutellar area and shoulders pruinose. *Legs* yellowish, apices of tarsal segments dark, knees indistinctly darkened, or femora with subapical dark ring; anterior femur longer than tibia, but only slightly so, L.R. about 1·8, anterior tarsus with slight beard. *Wings* with veins seamed with grey (Pl. 1, fig. *a*), two clouds in cell R_5 and one in M_2, cross-vein blackened, halteres pale. *Abdomen* yellowish-brown and without distinct markings; hypopygium similar to *congolensis*.

Female. Rather darker than male but wing markings more distinct; antennae with segment 6 only one and a half times as long as 5.

Type locality of *calipterus* S. W. AFRICA: Rooibank; of *tavetae*, KENYA: Taveta of *niliacus* SUDAN: Shambe; of *hexastictus*, EGYPT: Maadi.

DISTRIBUTION. A very widespread species; the following records are additional to my previously published records from Cape Province, Transvaal, S. W. Africa and Kenya. BELGIAN CONGO: 1 ♀, Bambesa (*J. Vrydagh*). UGANDA: 1 ♀, Semliki Forest, viii.1952 (*D. S. Fletcher*). Sudan: 1 ♂, 2 ♀, Yirol, iii.1954 (*E. T. M. Reid*). DAHOMEY: 3 ♀, Porto Novo, xii.1954 (*J. Hamon*). GOLD COAST: 1 ♂, Accra, i.1920 (*A. Ingram*). HAUTE VOLTA: 1 ♀, Bobo Dioulasso (*J. Hamon*). SENEGAL: 2 ♂, Marsassoum, ix.1953 (*J. Hamon*). MADAGASCAR: 1 ♂, Perinet, xii.1955 (*B. Stuckenberg*).

Chironomus (Chironomus) acuminatus sp. n.

A plain green species with reddish thoracic markings; A.R. about 4, L.R. 1·75, prothorax of normal size. Distinguished from other similarly marked species mainly by the male hypopygium which has a structure quite unlike other species of the subgenus (Text-fig. 4, *a*). The style shape suggests that it belongs to the group *Camptochironomus* but the shape of the anal point and the presence of a well-formed appendage 1 preclude that. On external features it fits into *Chironomus* sensu stricto and I prefer to regard it as a distinctive species of that subgenus.

Male. Wing length 3 mm.

Head greenish, mouthparts yellowish-brown, frontal tubercles present, pedicel reddish, A.R. about 4. *Thorax* green and with hardly any pruinosity; mesonotal stripes, postnotum and sternopleuron reddish-yellow; dorso-central hairs pale and irregularly biserial. *Legs* yellowish, femora and tibiae rather greener, tarsal segments dark at apices, L.R. 1·75, anterior tarsi not bearded. *Wings* with slight darkening at cross-vein, halteres green. *Abdomen* plain green, unmarked; hypopygium (Text-figs. 4, *a*, *e*) very characteristic; style pointed, broad basally and with inner margin flattened; appendage 1 narrow and bare, appendage 2 long, well furnished with hair and with a long curved one at the apex; anal point deep in side view and flattened and broadened apically in dorsal view.

Female not known.

Holotype male, NIGERIA: Onitsha (*D. Anderson*) in British Museum.

Chironomus (Chironomus) formosipennis Kieffer

Chironomus formosipennis Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena,* **13** : 159.
Chironomus palustris Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 16 ; Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 18 (in subgenus *Calochironomus*) ; (SYN. NOV.).
Chironomus iricolor Kieffer, 1914, *Ann. S. Afr. Mus.* **10** : 264.
Calochironomus oxylabis Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 67 ; Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 467.
Calochironomus nilicola Kieffer, 1922, *ibid.* **91** : 70 (SYN. NOV.).
Calochironomus pictiventris Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 382 (SYN. NOV.).
Calochironomus oxylabis var. *linea* Kieffer, 1925, *Bull. Soc. R. ent. Égypte,* **1924** : 291.

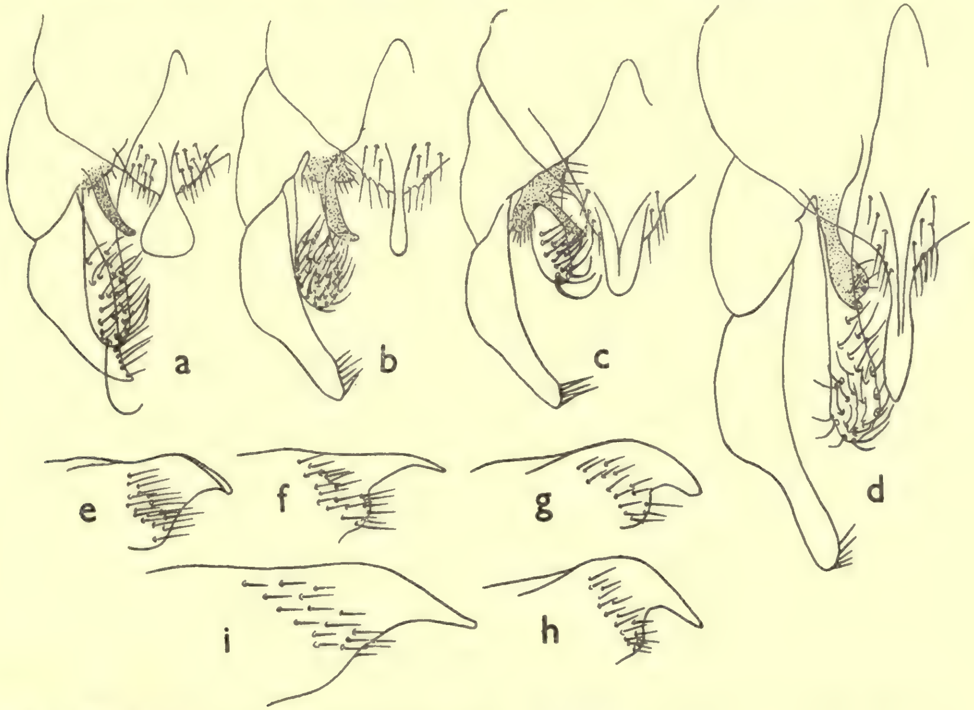

FIG. 4. Male hypopygia of *Chironomus* subg. *Chironomus* ; (*a*)–(*d*) in dorsal aspect, (*e*)–(*i*) anal point in lateral aspect. (*a*) *C. acuminatus* ; (*b*) *C. formosipennis* ; (*c*) *C. imicola* ; (*d*) *C. tetraleucus* ; (*e*) *C. acuminatus* ; (*f*) *C. formosipennis* ; (*g*) *C. imicola* ; (*h*) *C. seydeli* ; (*i*) *C. tetraleucus*.

I have not seen the type of *formosipennis* which is not in the Berlin Museum and is probably lost, but the description and the figure of the wing makes it certain that this is the species for which I have previously used the name *palustris*. Another possible synonym is *capensis* Kieffer *pro parte* (see under *caffrarius*), because there is a female of *formosipennis* in the South African Museum marked as a type specimen of *capensis*. The description of *capensis* mentions that the wings are hyaline, which may mean that the specimen was marked as a type in error; it has no data label.

C. formosipennis is one of the most distinctive of the African species because of the wing clouds, the oval or linear dark abdominal spots which are placed anteriorly on the segments and the heavily bearded male front tarsi.

Male. Wing length 3·5–5·5 mm.

Head brownish, palpi blackish, A.R. about 5, frontal tubercles present. *Thorax* with yellowish background; stripes, apex of postnotum and sternopleuron reddish, bristles pale and not very obvious, pale areas pruinose but not strikingly so. *Legs* yellow, last tarsal segment and sometimes apices of other segments dark, knees plain; well developed and strong beard present on apical half of anterior basitarsus and on second and third segments. *Wings* lightly clouded as in Pl. 1, fig. *b* of female, cross-vein darkened. *Abdomen* pale greenish-yellow with a central, narrow, interrupted, dark stripe, which is particularly obvious on segments 2–4, where it is usually expanded to form oval dark spots basally on each segment. Hypopygium (Text-figs. 4, *b*, *f*) with pubescent area at base of appendage 1 larger than usual, causing the species to be easily recognizable.

Female. Similar to male; abdominal markings less easily distinguishable, especially in dried specimens; wing markings darker, tarsal beard absent; antennal segments 3–5 with short necks, segment 6 slightly longer than 4 and 5 together, hairs on 6 numerous and short.

Type locality of *formosipennis* S. W. AFRICA: Rooibank. I have seen the type series of: *palustris* (Muséum National d'Histoire Naturelle, Paris, type locality KENYA: Naivasha); *iricolor* (South African Museum, type localities Cape Town and ORANGE FREE STATE: Smithfield); *pictiventris* (South African Museum, type locality Vryburg). *C. oxylabis* and *nilicola* were described from Sudan.

DISTRIBUTION. A common and widespread species in South, East and Central Africa and across to Nigeria and French Sudan, known to me from: Cape Province, Natal, Orange Free State, Transvaal, S. W. Africa, N. Rhodesia, Nyasaland, Belgian Congo (Lualaba R. and Parc National Albert), Uganda, Kenya, S. Sudan, Nigeria (Onitsha and Gadau), Haute Volta (Bobo Dioulasso), French Sudan (Macina). In addition I have a male from St. Helena Island, iv.1954 (*J. R. MacIntyre*), and 3 ♂ from MADAGASCAR: Tananarive xii.1955 (*B. Stuckenberg*).

Chironomus (Chironomus) imicola Kieffer

Chironomus imicola Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 20.
? *Cryptochironomus fasciatus* Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 164.
Chironomus palpalis Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 197 (SYN. NOV.).
Chironomus reginae Goetghebuer, 1936, *Ibid.* **28** : 476 (SYN. NOV.).

The male is greenish with reddish-brown scutal stripes and dark spots on the abdomen, the femora are unmarked; the hypopygium is very characteristic with its broad anal point and narrow appendage 1 arising from a large basal pubescent pad. The female is a different-looking insect, darker in colour and with broad black bands occupying the apical third or more of the femora. The male hypopygium and the female femoral bands distinguish the species from all other African ones except *seydeli* which is a larger and bulkier insect with a slightly different anal point. It is similar to the Palaearctic species *paganus* Meigen in male hypopygial structure but is readily separated by colour and pattern; it falls into the group previously referred to as *Einfeldia*.

I have seen the type series of all species except *fasciatus* and am unable to see why Goetghebuer distinguished *reginae* from *palpalis*. From the description it seems likely that *fasciatus* belongs here.

Male. Wing length 3·0–3·5 mm.

Head brownish, palpi darker, frontal tubercles well developed, pedicel dark brown, A.R. about 4. *Thorax* greenish; stripes, apex of postnotum and sternopleuron reddish-brown, pale areas of scutum pruinose, bristles pale. *Legs* very pale green, tarsi almost white, extreme apices of tarsal segments darkened; L.R. 1·75, tarsal beard absent. *Wings* whitish, cross-vein darkened. *Abdomen* green, segments 2–5 each with a central rounded spot. Hypopygium (Text-figs. 4, *c*, *g*) quite different from any other African species except *seydeli*; appendage I with basal pubescent part enlarged and apical bare part smaller than usual, anal point very stout, down-curved and blunt-ended in side view.

Female differs from the male by being much darker in colour, the thoracic markings and the abdomen being largely dark brown, and by the presence of broad black rings occupying the apical third or half of the tibiae. In addition the anterior tibia is darkened on its basal half and the other tibiae may have sub-basal dark rings. Antennae with segment 6 about as long as 4 and 5 together.

Female cotypes of *imicola* in Muséum National d'Histoire Naturelle, Paris (type locality KENYA: Likoni, nr. Mombassa); holotype male and paratypes of both sexes of *palpalis* (locality BELGIAN CONGO: Katana, Kivu) and holotype female of *reginae* (locality BELGIAN CONGO: between Coquilhatville and Bumba) all in Musée Royal du Congo Belge. Type female of *fasciatus* is lost (locality SUDAN: Shambe).

DISTRIBUTION. It is a common, widespread and often abundant species, especially in tropical Africa. I have records from the following localities: TRANSVAAL: Letsitele River. S. RHODESIA: Salisbury. BELGIAN CONGO: Elisabethville, Eala, Stanleyville, Lake Edward, Kivu, Lake Albert. UGANDA: Lake Victoria. KENYA: Mombasa. SUDAN: Yirol, Khartoum. NIGERIA: Onitsha. DAHOMEY: Porto Novo. GOLD COAST: Accra, Kumasi, Obuasi. HAUTE VOLTA: Bobo Dioulasso. FRENCH SUDAN: Sikasso. SÉNÉGAL: Marsassoum.

Chironomus (Chironomus) seydeli Goetghebuer

Chironomus seydeli Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 477.

Chironomus rostrifer Freeman, 1955. *Explor. Parc Nat. Upemba* I, Miss. de Witte, fasc. **35** (6) : 97 and *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 15 (SYN. NOV.).

This species resembles a larger version of *imicola*. Wing length 5 mm., perhaps browner rather than green in general appearance, although there is still a good deal of green in the background. Structurally and in pattern exactly similar to *imicola* except for the anal point of the male which in side view (Text-fig. 4, *h*) is more sharply pointed and more downturned.

In his original description, Goetghebuer omitted the narrow part of appendage I both from his figure and from his description which led me to believe that *rostrifer* was different. Examination of his type has shown that the two are identical.

Holotype male of *seydeli* in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Bukama); holotype male of *rostrifer* in collection of Institut des Parcs Nationaux du Congo Belge (locality BELGIAN CONGO: Mabwe, Lac Upemba). It is probable that the smaller specimens referred to by me in 1955 from Parc National Albert are really *imicola*.

DISTRIBUTION. Known only from the type localities of Bukama and Mabwe which are about 70 miles apart.

Chironomus (Chironomus) tetraleucus Kieffer

(? *Chironomus schultzei* Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena*, **13** :161).

Chironomus tetraleucus Kieffer, 1914, *Ann. S. Afr. Mus.* **10** : 263 ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 15.

Chironomus biclavatus Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 384 (SYN. NOV.).

This is by far the largest African species of the subgenus and is easily recognized by its stout hairy legs, bearded male front tarsi, dark knees, high antennal and low leg ratios and unusually pruinose abdomen, apart from the distinctive features of the male hypopygium. It shows a superficial resemblance to *C.* (*Nilodorum*) *nigropunctatum*.

Chironomus schultzei may have been described from a mixed series of females of this species and males of some other but the type series is not to be found and it is impossible to be certain of its identity without either examination of this series or else a good deal of collecting in the type locality. I do not wish to use the name for this species until there is less doubt over its identity. I have seen type specimens of both of Kieffer's other two species and can confirm the synonymy.

Male. Wing length 5–7 mm., total body length may be 11 mm.

Head yellowish-brown, mouthparts brown, palpi rather short and with segments 2–4 subequal, frontal tubercles present, pedicel dark brown; antennae with dense brown plumes, A.R. more than 5. *Thorax* with grey pruinosity or dusting over the whole surface obscuring the pattern; stripes blackish and separate, background yellowish, dorso-central bristles pale, short for the size of the insect, multiserial; apex of postnotum and sternopleuron black beneath the dusting. *Legs* greenish-yellow, thicker than usual and with abundant soft hair especially on middle and posterior tibiae; knees, apices of tibiae and of tarsal segments slightly darkened; anterior tarsi with long and well-developed beard, L.R. 1·2. *Wings* darkened at the cross-vein, halteres pale. *Abdomen* black and covered with grey pruinosity, basal segment and apices of others rather paler; by moving insect in a strong light it is possible to break up pruinosity into four separate patches; abdominal hair dense and pale. Hypopygium (Text-figs. 4, *d*, *i*) with long and deep anal point; appendage 1 hairy and with a slight hook at apex, appendage 2 long and somewhat clubbed; styles often as shown, but variable and apical narrow portion may be much less strongly marked and shorter.

Female. Similar to male in general coloration and pattern; anterior tarsi without beard, antennae with segment 6 equal to 4 and 5 together.

Cotypes of *tetraleucus* (locality ORANGE FREE STATE: Smithfield) and holotype male of *biclavatus* (locality S. RHODESIA: Salisbury) in South African Museum. Type locality of *schultzei* S. W. AFRICA: Rooibank, type series not in Berlin Museum and probably lost.

DISTRIBUTION. CAPE PROVINCE: 5 ♂, 6 ♀, Ceres, xi.1920–i.1921 (*R. E. Turner*); 1 ♂, Queenstown, i–ii.1923 (*R. E. Turner*); 1 ♀, Swellendam, xi.1923 (*R. E. Turner*); 2 ♂, 2 ♀, Deelfontein, iii.1902 (*Sloggett*). ORANGE FREE STATE: 3 ♂, 1 ♀, Harrismith, ii.1927 (*R. E. Turner*). NATAL: 2 ♂, 1 ♀, Drakensburg, xi.1926 (*R. E. Turner*). N. RHODESIA: 3 ♀, Lake Bangweulu, ix–xii.1946; 2 ♀, ix–x.1955 (*A. E. King*). BELGIAN CONGO: 2 ♀, Elisabethville, xi.1933 (*C. Seydl*); 8 ♂, 2 ♀, Kalondo, Kivu (*de Witte* and *Damas*). UGANDA: 5 ♂, Jinja, ii.1955 (*P. S. Corbet*).

Chironomus MEIGEN SUBGENUS ***Halliella*** KIEFFER

Halliella Kieffer, 1911, *Rec. Ind. Mus.* **6** : 172 ; Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 63; Kieffer, 1921, *Ann. Soc. ent. France,* **90** : 26 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte,* **1924** : 303 ; Kruseman, 1949, *Bijdr. Dierk.* **28** : 252 ; Wülker, 1957, Arch. Hydrobiol. Suppl. **24** : 281.
Baeotendipes Kieffer, 1913, *Rec. Ind. Mus.* **9** : 127 ; Kieffer, 1918, *Ann. Mus. nat. Hung.* **16**, 74 ; Kieffer, 1921, *Ann. Soc. ent. France,* **90** : 26 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte,* **1924** : 279 (SYN. NOV.).

Male antennae 12-segmented and reduced in length, female antennae 6-segmented; frontal tubercles present; palpi very short, segments almost rounded. Prothorax collar-like and with a shallow central indentation; anterior tibia without spur, scale rounded, L.R. about 1, middle and posterior tibiae with rather narrow combs, each with a short spur, pulvilli present, but small in one species; wings milky, R_{2+3} separated from R_1, posterior fork below cross-vein, squama fringed. Male hypopygium with appendages 1 and 2 well developed, styles rather pointed.

The subgenus shows some similarity to *Nilodorum* but the larger prothorax is sufficient to distinguish the two. There seems to be no reason for maintaining it as a separate genus because all the important characters are similar to those of *Chironomus*; it differs mainly in the reduction of mouthparts and male antennae. Where the larvae are known, they are associated with salt water (Wülker, 1957); the larva of the new species probably has a similar habitat.

Halliella and the type species *H. noctivaga* Kieffer were described from two males and six females captured by Annandale on a ship in the Suez Canal in October 1907. Two males and four females of this series are in the British Museum and enable me to say that it is the same species as Kieffer described under the name *H. brevimanus* from Tunis, because the antennal and palp differences mentioned by him do not exist, the descriptions of these parts given in 1911 being inaccurate.

Baeotendipes was based on material collected, again by Annandale, on a ship in the Suez Canal in October, but the year is not stated. The male hypopygium is similar to that of *H. noctivaga,* but Kieffer says that the male antenna is only 10-segmented and that the empodium is long. However, despite Kieffer's statement to the contrary, the empodium of *Halliella* is also long; in addition the antennal segments are difficult to count and were almost certainly incorrectly counted by Kieffer. The close resemblance of the hypopygium, the reduced antennae in the male and the short palpi make it certain that *Baeotendipes* is to be regarded as a synonym of *Halliella* and that it was the same species with which Kieffer was dealing. In 1913 Kieffer incorrectly stated that *Halliella* was described from " Indes ", and in 1921 that *Baeotendipes* was from " Indes Orientales ".

The new species described below differs from the type species in the shortness of the pulvilli which are extremely large in *noctivaga*, but the general resemblance in all other characters is such that I have no hesitation in placing it in this subgenus.

KEY TO SPECIES OF *Chironomus* SUBG. *Halliella*

Anterior tarsi of male not bearded, pulvilli very large . . . . *noctivaga* Kieffer
Anterior tarsi of male with well-developed beard, pulvilli short . . *ovazzai* sp. n.

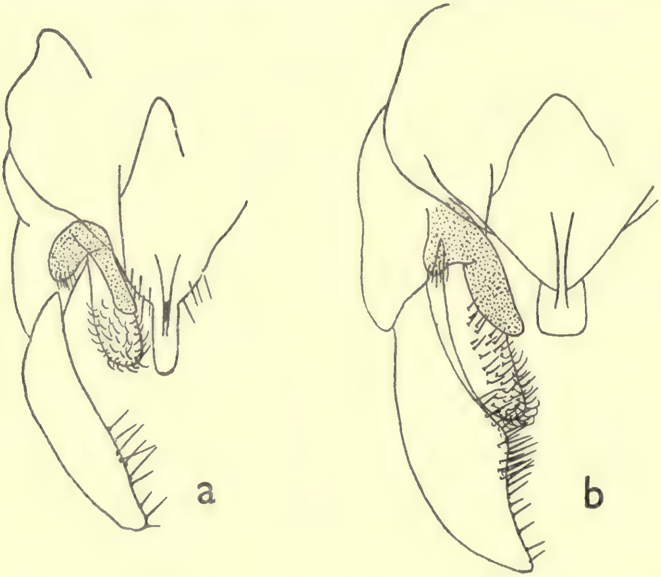

FIG. 5. Male hypopygia of *Chironomus* subg. *Halliella*. (*a*) *C. ovazzai*; (*b*) *C. noctivaga*.

Chironomus (Halliella) ovazzai sp. n.

A greyish species, wings milky, legs yellowish or white, knees darker, anterior tibia of male well bearded; distinguished from *noctivaga* by the narrower styles and anal point and by the reduced pulvilli.

Male. Wing length 2·5 mm.

Head dark brown, palpi extremely short, segments hardly as long as wide, antennae short for the size of the insect, with 12 segments, fully plumed, A.R. about 3, frontal tubercles present. *Thorax* yellowish-brown with black mesonotal stripes, postnotum and sternopleuron, completely covered with grey pruinosity; prothorax collar-like and with a shallow central emargination. *Legs* yellowish and with whitish tarsi; apices of femora and bases of tibiae brown; front tibia without spur, L.R. hardly 1, tarsi with strong beard; four posterior tibiae with low combs each bearing a short spur; pulvilli short but distinct. *Wings* milky, cross-vein slightly darkened, halteres pale. *Abdomen* blackish, some basal segments paler laterally, covered with grey pruinosity. Hypopygium (Text-fig. 5, *a*) with strong anal point, appendage 1 bilobed, the inner lobe longer and bare, styles narrower than in *noctivaga*.

Female similar in colour and general structure to male; antennae 6-segmented, whorl hairs short, not more than twice length of segments; segments 3–4 narrower apically but without distinct necks, segment 6 longer than 3–5 together.

Holotype male and paratype 1 ♀ ETHIOPIA: Assab, Salt Works, xi.1953 (*M. Ovazza*) in British Museum.

Chironomus (Halliella) noctivaga Kieffer

Halliella noctivaga Kieffer, 1911, *Rec. Ind. Mus.* **6** : 173.
Baeotendipes brevicornis Kieffer, 1913, *ibid.* **9** : 127 (SYN. NOV.).
Halliella brevimanus Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 63 ; Kruseman, 1949, *Bijdr. Dierk.* **28** : 252 (SYN. NOV.).
Baeotendipes tibialis Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 74 (SYN. NOV.).

Although this species has a Mediterranean distribution I am mentioning it here because, having seen type material of two of the above species, I am able to disentangle the rather confused situation surrounding the species.

As stated above, *noctivaga*, *brevicornis* and *brevimanus* are all clearly synonymous; *noctivaga* and *brevicornis* were both described from Suez, *brevimanus* from Tunis. I have been able to borrow the type of *B. tibialis*, a female from Ismailia, which is in the Hungarian National Museum, and have found it to be the same species again.

The species is readily recognizable because of the reduced male antennae, very short palpi, absence of tarsal beard, large pulvilli and stout male hypopygium (Text-fig. 5, *b*) which, though similar to *ovazzai* in some respects, is quite different in details of structure, especially shape of style and anal point.

All the material in the British Museum comes from the Suez Canal.

Chironomus MEIGEN SUBGENUS ***Endochironomus*** KIEFFER

Endochironomus Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 69 ; Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** : 273 ; Lenz, 1922, *Verh. int. Ver. Limnol. Kiel,* **1922** : 158 ; Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*) : 9 ; Freeman, 1955, *Ann. Mus. Congo, Tervuren,* **36** : 288.
Chironomus subg. *Endochironomus* Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 393.
Demeijerea Kruseman, 1933, *Tijdschr. Ent.* **76** : 154 ; Goetghebuer, 1937, in Lindner, *Flieg. Pal. Reg.* **3** (13*c*) : 11 (SYN. NOV.).
Tanytarsus subg. *Endochironomus* Townes, 1945, *Amer. midl. Nat.* 34 : 64.
Glyptotendipes subg. *Demeijerea* Townes, 1945, *ibid.* **34** : 136.

Antennae typically 14-segmented in the male and 7-segmented in the female but they may be 12- and 7- or 12- and 6-segmented; frontal tubercles present or absent. Prothorax reaching up to front of mesonotum and typically bilobed but sometimes collar-like though without V-shaped emargination; anterior tibial scale sometimes with short spur (Text-fig. 2, *b*), posterior tibial combs usually each with a spur but they may be reduced or even quite absent; R_{2+3} usually ending well beyond R_1. Male hypopygium with strong anal point and with both coxite appendages present, appendage 1 variable in shape, appendage 2 strongly formed and not bowed ventrally or racket-shaped, styles not strongly contracted apically.

There are five African species which fall fairly well within the limits of *Endochironomus* but none is completely typical. Edwards (1929) used the two-lobed pronotum as the most important character for the subgenus, but those African species which exhibit this feature well, differ either in the absence of posterior tibial spurs (*woodi*) or in the antennal segmentation. Kruseman (1933) erected the genus *Demeijerea* for a Palaearctic species (*rufipes* Linnaeus) with 12-segmented antennae in the male and it would be possible to carry this type of genus formation much further in the African fauna. It seems however, unwise to increase the number of genera or subgenera unnecessarily when by altering the definition slightly, these somewhat anomalous forms can be admitted.

I am following Edwards in treating the group as a subgenus of *Chironomus*. Kruseman and Goetghebuer treated both *Endochironomus* and *Demeijerea* as full genera, whilst Townes placed the former as a subgenus of *Tanytarsus* (= *Phaenopsectra* Kieffer) and the latter as a subgenus of *Glyptotendipes*, but the size of the prothorax seems to me to indicate a closer affinity with *Chironomus*.

Only one African species, *E. ituriensis* Goetghebuer has been described in this subgenus, but examination of the type shows it to be a re-description of *Nilodosis fusca* Kieffer (see under that genus). Goetghebuer described another species as *Glyptotendipes disparilis*, but the prothorax is too large in my opinion for it to be placed in that genus and, despite the antennal segmentation, it seems to be best placed in *Endochironomus*.

Key to the African Species of *Chironomus* Subg. *Endochironomus*

1.	Tarsi black and white ; thorax and segment 6 of abdomen covered with silvery " bloom " type of pruinosity ; tibial combs unarmed	*woodi* sp. n.
	Tarsi plain, brown or blackish ; thorax not silvery ; combs spurred	2
2.	Male antennae with 14 segments, female with 7 ; pronotum collar-like	3
	Male antennae with 12 segments, female with 6 ; pronotum bilobed	4
3.	Legs black ; appendage 1 of male hypopygium in two parts, 2*a* absent (Text-fig. 6, *a*)	*acutistilus* Freeman
	Legs yellowish, appendage 1 hooked, 2*a* present (Text-fig. 6, *b*)	*avicula* Freeman
4.	Black, thoracic margins slightly brown	*hamatus* sp. n.
	Thorax green with red or dark brown stripes	*disparilis* Goetghebuer

Chironomus (Endochironomus) acutistilus Freeman

Endochironomus acutistilus Freeman, 1955, *Ann. Mus. Congo, Tervuren, Zool.* **36** : 288.

A fairly large blackish species with pruinose thorax; male antenna with 14 segments, female with 7; frontal tubercles absent; prothorax collar-like; legs black, anterior tibia without spur, posterior tibiae with two spurs; male hypopygium with conical anal point, divided appendage 1 and pointed styles.

Male. Wing length 3·5 mm.

Head, mouthparts and pedicel blackish, flagellum and plumes more brown; A.R. about 2·6, antennae 14-segmented, frontal tubercles absent. *Thorax* blackish or very dark brown, covered fairly uniformly but thinly with grey pruinosity; acrostichal bristles absent, dorso-centrals pale and uniserial; prothorax reaching well up to front of mesonotum, joined across as a narrow band without the well-defined knobs typical of the genus. *Legs* blackish-brown, paler only on the trochanters; anterior tibial scale rounded, A.R. about 1·4, tibia about three-quarters length of femur; middle and posterior tibiae with rather conical combs each with a short spur, pulvilli present. *Wings* without dark markings but yellowish basally; R_{2+3} well separated from R_1; halteres pale. *Abdomen* blackish-brown, pruinose and with dark bristles. Hypopygium (Text-fig. 6, *a*) quite characteristic; anal point long and conical, styles pointed; appendage 1 in two parts, a broad lower piece with 2 hairs at its inner apex and a narrow curved bare upper piece; appendage 2 broad and short.

Female similar to male; antennae with 7 segments, 3–6 with short necks, 7 nearly as long as 4–6 together.

Holotype male in British Museum, type locality BELGIAN CONGO: Elisabethville.

DISTRIBUTION. The following records are additional to previously published records from Ruanda, Uganda and Elisabethville. UGANDA: 4 ♂, 7 ♀, Jinja, ix–x. 1954 (*P. S. Corbet*). FRENCH WEST AFRICA: 1 ♂, Haute Volta, Bobo Dioulasso, i.1953 and 1 ♂, ix.1956 (*J. Hamon*). SIERRA LEONE: 2 ♀, Njala (*E. Hargreaves*). BELGIAN CONGO: 1 ♂, Katanga, Kafubu Mission, ix.1931 (*A. Mackie*). RHODESIA: 2 ♀, Salisbury, iv.1956 (*E. T. M. Reid*).

Chironomus (Endochironomus) avicula Freeman

Endochironomus avicula Freeman, 1955, *Ann. Mus. Congo, Tervuren, Zool.* **36** : 289.

Very similar to *acutistilus* in general appearance and structure, legs paler brown, femora almost yellow, anterior tibia darker than the others. Easily separated by the male hypopygium (Text-fig. 6, *b*) in which anal point is narrower, style long and narrow, appendage 1 of a characteristic shape, sometimes rather wider than shown in the figure, appendage *2a* present, short and with a brush of fairly long hairs.

Holotype male in British Museum, type locality NIGERIA: Onitsha.

DISTRIBUTION. Apart from the type locality, paratypes were recorded from BELGIAN CONGO: Stanleyville and Léopoldville. There is one further record of FRENCH CAMEROONS: 3 ♂, Kribi, iii.1953 (*J. P. Adam* and *J. Rageau*).

Chironomus (Endochironomus) disparilis Goetghebuer

? *Glyptotendipes disparilis* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 462.
Endochironomus disparilis Freeman, 1955, *Explor. Parc National Albert,* Miss. de Witte, fasc. **83** : 24.

Greenish, thorax shining, stripes reddish in the male and dark brown in female, abdomen with dark spots, male antenna with 12 segments, of female with 6, male anterior tarsus bearded, hypopygium characteristic.

In thoracic structure this species fits best into *Endochironomus* and the male hypopygium shows some resemblance to *acutistilus*, but the reduced antennal segmentation and the proximity of R_1 and R_{2+3} afford a link with *Chironomus* sensu stricto. The antennal segmentation caused Goetghebuer to place it in *Glyptotendipes* from which it is precluded by the thoracic structure.

Male. Wing length 3–3·5 mm.

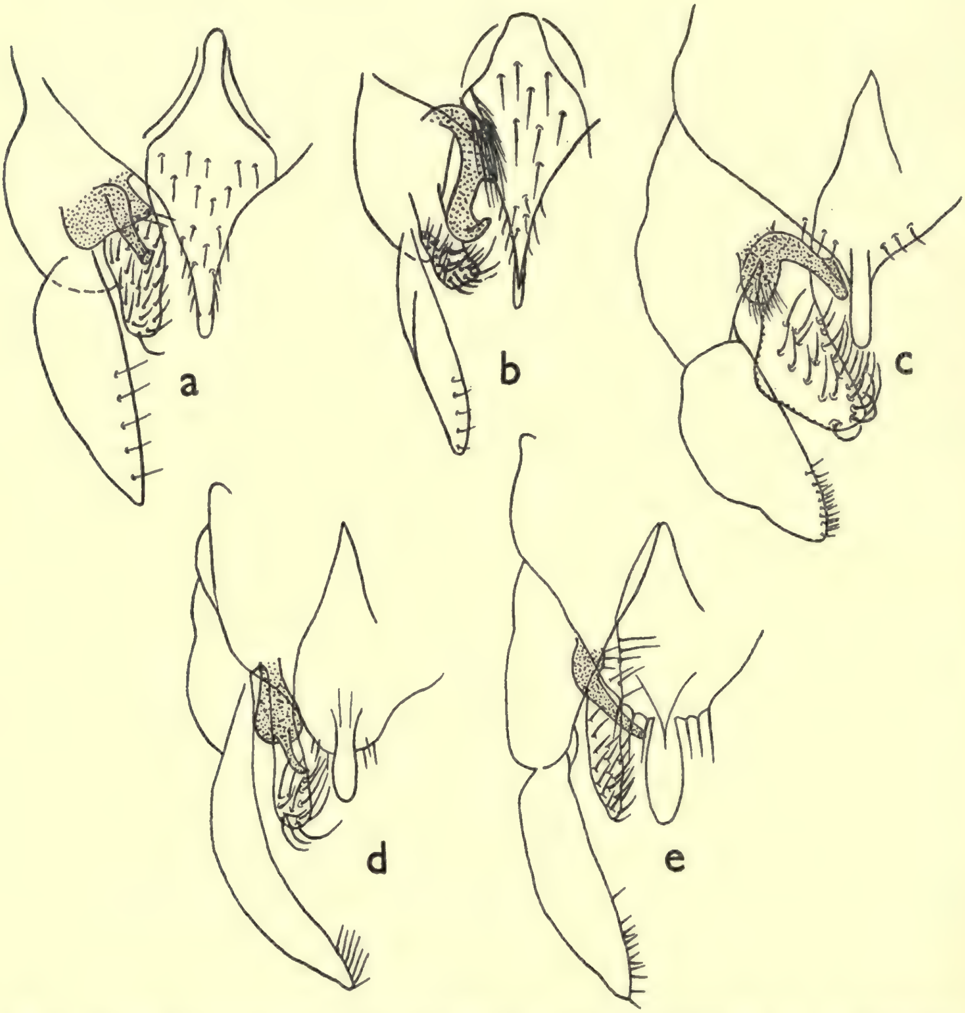

FIG. 6. Male hypopygia of *Chironomus* subg. *Endochironomus.* (*a*) *C. acutistilus ;* (*b*) *C. avicula ;* (*c*) *C. disparilis ;* (*d*) *C. hamatus ;* (*e*) *C. woodi.*

Head greenish-brown, palpi moderately developed, frontal tubercles just visible, antennae with 12 segments, A.R. about 4. *Thorax* yellowish-green, shining; stripes, postnotum and sternopleuron reddish; central stripes usually with a pair of small dark spots at their posterior extremities; acrostichal bristles present; prothorax bilobed and fairly typical of the subgenus. *Legs* yellowish-brown, knees and apices of tibiae and of tarsal segments darker in some specimens; anterior tibiae with strong beard, L.R. about 1·5, anterior tibia without spur, posterior tibiae with combs not as strongly conical as in *acutistilus*, each with a spur. *Wings* plain, halteres greenish, R_{2+3} lying close to R_1 apically. *Abdomen* greenish, each segment with a large oval dark spot; hypopygium (Text-fig. 6, *c*) with short styles which are slightly contracted apically, appendage 1 with a transverse arm, 2 short and thick, anal point short.

Female differs from male in the darker thoracic markings which may be almost black, by the brown anterior tibia and by the darker abdomen; the central thoracic stripes may be joined to posterior border of thorax. Antennae with 6 segments, 3–5 with well formed necks, 6 hardly longer than 5; frontal tubercles small but distinct.

I have seen the holotype male in Musée Royal du Congo Belge.

DISTRIBUTION. Very abundant in the type locality BELGIAN CONGO: Parc National Albert, cratère Mugunga. I have also seen BELGIAN CONGO: 2 ♀, Lac Gando; 1 ♂ Ngoma, Lac Biuniu. S. W. AFRICA: 1 ♂, Windhoek, i.1934 (*K. Jordan*).

Chironomus (Endochironomus) hamatus sp. n.

Blackish with some grey dusting; frontal tubercles well developed, male antenna with 12 segments, female with 6; prothorax divided centrally; appendage 1 of male hypopygium with a narrow apical hook, very similar to that of the Palaearctic species *C.* (*E.*) *intextus* Walker from which it may be separated by the reduced antennal segmentation, presence of frontal tubercles and narrow styles.

Male. Wing length 3·3 mm.

Head black, frontal tubercles well developed; antennae with 12 segments, A.R. about 3. *Thorax* black and with thin grey dusting; shoulders and lateral mesonotal margins brownish; pronotum divided centrally and more or less two-lobed; acrostichal bristles present. *Legs* dark brown, posterior 4 tibiae paler centrally; anterior tibia probably without spur but not clear on the specimens available; L.R. 1·5, tarsus slightly bearded, posterior tibial combs not strongly conical, each with a spur. *Wings* unmarked, yellowish basally, R_{2+3} well separated from R_1, halteres pale. *Abdomen* black, slightly dusted, hairs pale; hypopygium (Text-fig. 6, *d*) with appendage 1 broad basally and with a narrow hook, similar to *C.* (*E.*) *intextus* Walker (Palaearctic Region), styles narrower.

Female not known.

Holotype male and paratypes 3 ♂, BELGIAN CONGO: Elisabethville, iii.1939 (*H. J. Brédo*). One paratype in British Museum, holotype and remainder of series in Institut Royal des Sciences naturelles de Belgique.

Chironomus (Endochironomus) woodi sp. n.

A most distinctive black species, easily recognized by the silvery pruinosity on thorax and segment 6 of abdomen, and by the white markings on the tarsi. Male antenna 14-segmented, female 7-segmented, prothorax divided and with two lobes, anterior tibia with a short spur, middle and posterior tibiae completely lacking spurs.

This species fits well very into *Endochironomus* except for the complete absence of posterior tibial spurs. However, there is a tendency among the Palaearctic species of the subgenus for a reduction of these spurs and I am therefore assuming the condition in *woodi* to be secondary reduction.

Male. Wing length 2·5 mm.

Head black, palpi a little shorter than usual, frontal tubercles absent, antennae with 14 segments, A.R. 1·8. *Thorax* black, mesonotum and pleura with silvery pruinosity which is so arranged that when viewed from the front the shoulders appear black; acrostichals well developed; prothorax strongly bilobed and quite typical for the subgenus. *Legs* very dark brown or blackish; posterior 4 femora with a broad brown ring near apex, anterior basitarsus pure white, other basitarsi also pure white but with a broad black ring about one-third of the length of the segment and placed near the middle, second and sometimes third segments of middle and posterior tarsi white, anterior tibia with short spur, posterior tibial combs narrow, more or less fused and quite lacking spurs. *Wings* very slightly smoky, veins brown, R_{2+3} with slight separation from R_1 at apex ; halteres blackish. *Abdomen* black with black hairs ; segment 6 with silvery pruinosity ; hypopygium (Text-fig. 6, *e*) of rather simple form, appendage 1 slightly curved.

Female essentially similar to male in colour and pattern; antennae with 7 segments, 3–6 spindle-shaped, 7 nearly as long as 5 and 6 together.

Holotype male and paratypes 2 ♂, 3 ♀, NYASALAND: Ruo, iv.1916 (*R. C. Wood*). Other paratypes: NYASALAND: 1 ♂, Ruo Valley, Chiromo, iv.1910 (*S. A. Neave*). UGANDA: 1 ♂, Nakubzidza (?), v.1937 (*G. L. R. Hancock*). NIGERIA: 3 ♂, Zungeru, xi.1910 (*J. W. S. Macfie*); 1 ♀, Onitsha (*Anderson*). FRENCH WEST AFRICA: Haute Volta, 4 ♂, nr. Bobo Dioulasso, ix.1956 and 2 ♂, Nasso, iv.1956 (*J. Hamon*). French West African specimens in collection of O.R.S.T.O.M., remainder of series in British Museum.

Chironomus MEIGEN SUBGENUS ***Dicrotendipes*** KIEFFER

Dicrotendipes Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 23 ; Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 63 ; Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 256–260 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 297 ; Freeman, 1955, *Explor. Parc Nat. Albert.* Miss. de Witte, fasc. **83** : 20.

Limnochironomus Kieffer, 1920, *Ann. Soc. sci. Brux.* **39** (1) : 166.

Carteria Kieffer, 1921, *Philippine J. Sci.* **18** : 590 ; Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 465 (SYN. NOV.).

Calochironomus Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 274 ; Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 66 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 290.

Carteronica Strand, 1928, *Arch. Naturgesch.* **92** : 48 (*nom. nov. pro Carteria* Kieffer).

Chironomus subgenus *Chironomus* Group C, Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 386.

Chironomus subgenus *Limnochironomus* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 464 ; Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Reg.* 3 (13*c*) : 19 ; Townes, 1945, *Amer. midl. Nat.* **34** : 102.

Chironomus subgenus *Dicrotendipes* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 466 ; Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*) : 31.

Chironomus sensu stricto Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 470 (in part).

Frontal tubercles usually absent or small, well developed in a few species only, palpi long; prothorax reaching up to front of thorax, but divided by a suture in the middle, closely applied to mesothorax and not collar-like; thorax rarely pruinose and then without silvery lines, often shining; wings sometimes with dark markings; male hypopygium with both appendages 1 and 2 present and fully developed. Subgenus most easily recognized by the male hypygium; appendage 1 varies from species to species, but appendage 2 is always narrow at least basally, bowed ventrally and usually expanded distally with curved hairs at the apex, exact shape offers good specific characters; styles usually not sharply contracted at apices, with a few bristles along inner margin.

When Kieffer described *Dicrotendipes* he included only *D. pictipennis* (= *pilosimanus* 14-*punctatus*), an East African species with spotted wings which is automatically the type species of the genus. The sole character of the genus was the forking of appendage 2 of the male hypopygium. In a later described species, *D. cordatus* Kieffer, the wings are heavily marked but appendage 2 is only heart-shaped at the apex.

In the description of *Limnochironomus*, Kieffer stated that appendage 2 was long, narrow and strongly curved with the extremity enlarged and either simple or imperfectly bi- or trifid. The other characters mentioned, of proportions of pulvilli and spurs apply equally to *Dicrotendipes*. Kieffer has himself described a species of *Dicrotendipes* with plain wings (? Variety of a spotted winged species) and both genera include species with appendage 2 imperfectly divided at the apex. In thoracic structure, *Limnochironomus* species are identical with species of *Dicrotendipes* and as there is nothing left to separate them, it is necessary to treat *Limnochironomus* as a synonym of the earlier described *Dicrotendipes*.

Kieffer described *Calochironomus* in his key to the African genera (1921), separating it from other genera because appendage 2 was neither forked nor narrow and because the wings were spotted. However, out of six included species only one was known in the male sex, the type species, *C. fusconotatum* Kieffer being described from the female. His key bifurcates at couplet 32 into " males " and " females ", all three genera, *Dicrotendipes*, *Calochironomus* and *Limnochironomus* appearing in the " male" section, but only *Calochironomus* in the " female " section, with the result that females of *Dicrotendipes* with spotted wings will only run down to *Calochironomus*. *Calochironomus fusconotatum* and two other species agree closely with species of *Dicrotendipes* and I am therefore forced to conclude that the two genera are synonymous. The single species of *Calochironomus* of which the male was known to Kieffer and on which the male characters of the genus were based is *C. oxylabis* Kieffer. This is quite unlike the other species and is a re-description of *Chironomus* (*C.*) *formosipennis* Kieffer.

Edwards (1929) recognized *Limnochironomus* only as a species group of his subgenus *Chironomus* sensu stricto. One of the principal characters of the subgenus *Chironomus* is the collar-like and undivided structure of the pronotum, but, in the Palaearctic species formerly placed in *Limnochironomus* and in the tropical African species of *Dicrotendipes*, the pronotum is more reduced and is divided by a suture, much as it is in *Cryptochironomus* and *Nilodorum*.

Carteria Kieffer (re-named *Carteronica* by Strand owing to its being preoccupied) was separated mainly on the shape of the styles of the male hypopygium. The females of the African species are similar to species of *Dicrotendipes*, their only peculiarity being the central black line on the thorax. Intermediate stages in the formation of this black line are shown by *D. nigrolineatus* sp. n. and *chloronotus* Kieffer, whilst the male of *D. crispi* sp. n. possesses curiously bent styles, which with its other characters place it in an intermediate position between *Carteria* and *Dicrotendipes*. *Carteria* and *Carteronica* must therefore fall as synonyms.

Table III details the African species placed by Kieffer in *Dicrotendipes* and *Calochironomus* and gives their position in this Study. In addition, the following species described by Kieffer are now placed in *Dicrotendipes*: (1911) *Chironomus binotatus*, *seychelleanus* and *chloronotus*; (1923, *Ann. Soc. ent. France*) *Chironomus niloticus*; (1923, *Ann. Soc. sci. Brux.*) *Chironomus latilobus*.

Table IV gives the species described by Goetghebuer in all genera which are correctly to be placed in *Dicrotendipes*.

The 18 species which I am treating as belonging to this subgenus show some variety in structure and colour and fall into groups on colour and male genital structure. In the group allied to *D. pilosimanus*, appendage 2 is usually strongly forked and the wings carry distinct and often strong markings. There is a group of green species with reddish mesonotal stripes and with hypopygium of the typical *Limnochironomus* form; *D. chambiensis* is typical of these species. A third group shows the *Carteria* type of markings and genital structure but is linked to the second by intermediates.

TABLE III.—*Species Described by Kieffer in Dicrotendipes and Calochironomus*

Date	Original name	Position in present study
1913	*Dicrotendipes pictipennis*	*Chironomus* (*Dicrotendipes*) *pilosimanus 14-punctatus*
1914	*D. pilosimanus*	*Ch.* (*D.*) *pilosimanus pilosimanus*
1922	*D. trilabis*	? *Ch.* (*D.*) *fusconotatus*
	D. cordatus	*Ch.* (*D.*) *cordatus*
	D. leucolabis	*Ch.* (*D.*) *leucolabis*
	Calochironomus fusconotatum	*Ch.* (*D.*) *fusconotatus*
	Cal. oxylabis	*Ch.* (*Chironomus*) *formosipennis*
	Cal. griseonotatus	*Ch.* (*D.*) *fusconotatus*
	Cal. griseosparsus	*Ch.* (*D.*) *fusconotatus*
	Cal. niliacus	*Ch.* (*Chironomus*) *calipterus*
	Cal. nilicola	*Ch.* (*Ch.*) *formosipennis*
1923	*Chironomus* (*Cal.*) *pictiventris*	*Ch.* (*Ch.*) *formosipennis*
	Ch. (*Cal.*) *rostratiforceps*	*Ch.* (*Ch.*) *linearis*
1924	*Dicrotendipes peringueyanus*	*Ch.* (*D.*) *peringueyanus*
1925	*Calochironomus oxylabis* var. *linea*	*Ch.* (*Ch.*) *formosipennis*
	Cal. hexastictus	*Ch.* (*Ch.*) *calipterus*
	Cal. (?) *nitididorsum*	*Chironomus* sensu stricto, probably Palaearctic species
	Cal. nilophilus	
	Dicrotendipes forficula	*Ch.* (*D.*) *fusconotatus*
	D. speciosa	*Ch.* (*D.*) *pilosimanus 14-punctatus*
	D. nilicola	*Ch.* (*D.*) *fusconotatus*

TABLE IV.—*Species of Dicrotendipes Described by Goetghebuer*

Date	Original name	Position in present study
1934	*Paratendipes pictus*	*Chironomus* (*Dicrotendipes*) *cordatus*
1936	*Chironomus* (*Limnochironomus*) *chambiensis*	*Ch.* (*D.*) *chambiensis*
	Ch. (*L.*) *schoutedeni*	*Ch.* (*D.*) *schoutedeni*
	Ch. (*Carteria*) *regalis*	*Ch.* (*D.*) *regalis*
	Ch. (*Dicrotendipes*) *collarti*	*Ch.* (*D.*) *collarti*
	Ch. (*Chironomus*) *bredoi*	*Ch.* (*D.*) *bredoi*
	Ch. (*Ch.*) *henrardi*	*Ch.* (*D.*) *chloronotus*
	Polypedilum (?) *aequatoris*	*Ch.* (*D.*) *leucolabis*
	P. griseovittatum	*Ch.* (*D.*) *peringueyanus*
	P. 14-*punctatum*	*Ch.* (*D.*) *pilosimanus* 14-*punctatus*
	P. 4-*punctatum*	*Ch.* (*D.*) *fusconotatus*

KEY TO AFRICAN SPECIES OF *Chironomus* SUBG. *Dicrotendipes*

1. Wings with dark clouds, spots or bands 2

Wings without dark markings 9

2. Wings with spots or clouds (Pl. 1, figs. *c–f*) 3

Wings with broad blackish cross-bands (Pl. 1, figs. *g–i*) 7

3. Wing pattern formed of clouds and seams along the veins (Pl. 1, fig. *f*) . *sudanicus* sp. n.

Wing pattern including spots in the cells (Pl. 1, figs. *c–e*) 4

4. Anterior femora darkened apically, other knees quite pale and unmarked ; thorax greenish with reddish stripes, dorso-central bristles uniserial, their pits pale . 5

All knees blackened ; thorax grey, stripes dark brown, dorso-centrals bi- or triserial, their pits pale or darkened 6

5. Anterior tarsi of male strongly bearded . . . . *pilosimanus pilosimanus* Kieffer

Anterior tarsi of male without beard . . *pilosimanus* 14-*punctatus* Goetghebuer

6. Posterior fork cell usually with a central dark spot, when absent in teneral specimens then fork veins hardly darkened (Pl. 1, fig. *d*) . . . . . *fusconotatus* Kieffer

Posterior fork cell without central spot, fork veins strongly clouded (Pl. 1, fig. *e*) *peringueyanus* Kieffer

7. Wing band occupying apical half of R_{2+3} and extended beyond, base of cell R_5 quite clear ; abdominal segments yellow with brown basal bands . . *leucolabis* Kieffer

Wing band occupying basal portion of R_{2+3} and filling base of cell R_5 (Pl. 1, figs. *g*, *h*, *i*), abdomen completely black except sometimes for the male hypopygium . 8

8. Appendage 1 of male hypopygium broadened before apex, appendage 2 slightly bilobed (Text-fig. 7, *c*) ; wing markings more extensive (Pl. 1, figs. *g*, *h*) *cordatus* Kieffer

Appendage 1 of a more uniform width, appendage 2 with apical branch (Text-fig. 7, *d*) ; wing markings less extensive (Pl. 1, fig. *i*) . . . . *collarti* Goetghebuer

9. Thorax green or yellow with reddish or brown stripes 10

Thorax in most specimens with the central stripe overlaid with an extra dark brown or blackish stripe, in some specimens all 3 stripes similarly overlaid or only lateral ones, occasional specimens of *chloronotus* have thorax plain and can only be identified from male hypopygium 15

10. Ninth tergite of male appearing trifid, appendage 3 very narrow (Text-fig. 7, *h*) *bredoi* Goetghebuer

Ninth tergite not appearing trifid, appendage 2 wider at apex 11

11. Anal point of male broad and strongly downturned 12

Anal point narrow and less strongly downturned 13

12. Male hypopygium as in Text-fig. 7, *g, n* . . . . *kribiicola* Kieffer

Male hypopygium as in Text-fig. 7, *i, o* . . . . *ealae* sp. n.

13. Appendage 2 of hypopygium large and racket-shaped (Text-fig. 7, *j*) *schoutedeni* Goetghebuer

Appendage 2 narrower 14

14. Anal point narrow in lateral view and strongly curved, appendage 2 less swollen at apex (Text-figs. 7, *e, l*) . . . . *binotatus* Kieffer

Anal point wider in lateral view, appendage 2 more swollen at apex (Text-figs. 7, *f, m*) . . . . *chambiensis* Goetghebuer

15. Central thoracic dark stripe short, not longer than the underlying reddish stripe, or even absent (some *chloronotus*), male styles normal 16

Central thoracic dark stripe prolonged backwards over scutellum and postnotum, male styles either subovate or bent 17

16. Appendage 1 of male hypopygium broad (Text-fig. 7, *k*) . . *nigrolineatus* sp. n.

Appendage 1 elongated (Text-figs. 8, *a–c*) . . . . . . *chloronotus* Kieffer

17. Inner comb of posterior tibia with 4 or 5 spurs . . . . . *multispinosus* sp. n.

Inner comb of posterior tibia with normal single spur 18

18. Leg ratio less than 2, appendage 1 of male hypopygium short and without hair brush at base, appendage 2 not swollen subapically (Text-fig. 8, *f, l*). . *penicillatus* sp. n.

Leg ratio 2 or more, either hair brush present at base of appendage 1 or that appendage elongate, appendage 2 swollen subapically 19

19. Male style sharply bent, appendage 1 long and narrow (Text-fig. 8, *g*) . . *crispi* sp. n.

Male style broad, not bent, appendage 1 short and wide (Text-fig. 8, *d*) *regalis* Goetghebuer

Chironomus (Dicrotendipes) pilosimanus Kieffer

Dicrotendipes pilosimanus Kieffer, 1914, *Ann. S. Afr. Mus.* **10** : 262 ; Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 19 ; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 372.

Wings spotted, frontal tubercles large, thorax greenish and pruinose between the stripes which are conspicuous and reddish or brownish, abdomen greenish with darker central markings; IXth tergite of male with broad membranous expansion, appendage 2 branched, smaller branch at right angles and well removed from apex. Easily distinguished from *fusconotatus* by absence of pruinosity on stripes which are redder and by apex of only anterior femora being dark, other knees pale; separated from this and from subsp. *quatuordecimpunctatum* by presence of strong tarsal beard, although intermediates between the two subspecies are to be found in Transvaal.

There is an earlier name for this species, namely *pictipennis* Kieffer which is applicable to its subspecies (see below). However, with the use of *Dicrotendipes* as a subgenus only, this name is preoccupied and the species must take the later name *pilosimanus*, whilst the subspecies carries the only available later name *quatuordecimpunctatum*.

Male. Wing length 1·8–3·5 mm.

Head brown or brownish-yellow, mouthparts darker, pedicel brown, flagellum paler, A.R. about 3·5, frontal tubercles large and conspicuous. *Thorax* green or yellowish with whitish pruinosity on shoulders, lateral margins and prescutellar area; mesonotal stripes usually reddish-brown, partially darkened along margins and more or less fused across in the centre of the thorax, but in some specimens stripes darker brown; postnotum and sternopleuron usually darker than stripes even in paler specimens; dorso-central bristles uniserial, their pits not darkened. *Legs* pale yellowish-green, apex of anterior femur and apices of all tibiae blackish, knees of posterior 4 legs unmarked; anterior tarsi with apices of first and second segments darkened, segments 3–5 completely dark, tarsi of other legs with apices of segments 1–3 dark and 4–5 totally dark; anterior tarsi strongly bearded, tibial spurs distinct and well formed, L.R. 1·5, anterior femur about one and a quarter times length of tibia. *Wings* with 7 dark spots arranged as in Pl. 1, fig. *c* of female; halteres pale. *Abdomen* greenish, in most specimens with indications of brown markings centrally on segments 2–5, apex more generally dark in dried specimens; incisures pruinose, apex also pruinose. Hypopygium (Text-fig. 7, *a*) with branched appendage 2; the branch is at right angles and removed from the apex; appendage 1 evenly curved; styles slightly contracted apically, rather more curved than in *fusconotatus*; anal point downcurved, IXth tergite with broad membranous extension beneath anal point.

Female quite similar to male in colour and pattern, wing markings usually darker and occasionally with an additional black streak below Cu; abdomen more uniformly darkened; antennae with segment 6 equal to 4 and 5 together.

I have seen specimens from the type series which is in South African Museum (type locality, Cape Town).

DISTRIBUTION. CAPE PROVINCE: 4 ♀, Deelfontein, ii. 1902 (*Sloggett*); 1 ♂, 1 ♀, Mossel Bay (*R. E. Turner*); 2 ♂ Ceres, iii. 1925 (*R. E. Turner*); long series from Bergvliet, Rondebosch, Wellington (*K. M. F. Scott*). ORANGE FREE STATE: 2 ♀, Harrismith, ii. 1927 (*R. E. Turner*). NATAL: 1 ♂, Estcourt, ix. 1896 (*G. A. K. Marshall*); 1 ♀, Weenen, ix. 1928 (*H. P. Thomassett*). TRANSVAAL: series including intermediates, Olifantsvlei, nr. Johannesburg, ix. 1954 (*A. D. Harrison*); 4 ♂, 3 ♀, Pretoria, vi–ix. 1954 (*A. D. Harrison*). Additional records from these provinces and from Basutoland, Bechuanaland and S.W. Africa are given in my 1955 paper.

Chironomus (Dicrotendipes) pilosimanus

subsp. ***quatuordecimpunctatus*** Goetghebuer

Dicrotendipes pictipennis Kieffer, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 23; Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 22 (not *Chironomus pictipennis* Philippi, 1865, *Verh. Zool. Bot. Ges. Wien,* **15** : 600).

Dicrotendipes speciosus Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 256; Kieffer, 1925, *Ann. Soc. R. ent. Égypte,* **1924** : 299 (not *Chironomus speciosus* Kieffer, 1911, *Rec. Ind. Mus.* **6** : 133).

Polypedilum quatuordecimpunctatum Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 48.

Dicranotendipes speciosus Kruseman, 1949, *Bijdr. Dierkunde,* **28** : 254 (laps. cal.).

Very similar to typical subspecies in colour and general structure including hypopygium but differing in the absence of tarsal beard. A series taken in Transvaal near Johannesburg shows specimens with a short beard which is present only on segments 2–3 of the tarsus. The presence of these intermediates suggests that the two are geographical subspecies, *pilosimanus* being the South African representative and the present one the East and Central African. In size, *quatuordecimpunctatus* is often on the average smaller and the pattern may be less strongly marked. Occasional specimens are to be found with reduced wing spots but these are probably teneral.

It is unfortunate that with the use of *Dicrotendipes* as a subgenus, the earlier names become homonyms, so that it is necessary to use the name proposed by Goetghebuer. I was in error in 1955 in giving *Calochironomus griseonotatus* Kieffer and *nilicola* Keiffer as synonyms of this species; the first is really a synonym of *Chironomus* (*Dicrotendipes*) *fusconotatus* Kieffer and the other a synonym of *Chironomus* (*Chironomus*) *formosipennis* Kieffer.

I have seen the type series of *pictipennis* in Muséum National d'Histoire Naturelle, Paris (type locality KENYA: Naivasha). The holotype female of *Polypedilum quatuordecimpunctatum* is in Musée Royal du Congo Belge where I have seen it (locality KENYA: Nakuru) and I can confirm that the posterior tibia has two spurs and that the species belongs here. The type of *speciosus* appears to be lost (locality ALGERIA: Alger).

DISTRIBUTION. EGYPT: 1 ♀, Moascar, iii.1942 (*J. W. S. Macfie*). SUDAN: 3 ♂, 2 ♀, Kurra, N. Jebel Marra, vii.1932 (*M. Steele*). YEMEN: 2 ♂, San'a, x.1937 (*C. Rathjens*). ETHIOPIA: 2 ♀, Dessie, xii.1935 (*J. W. S. Macfie*). UGANDA: 9 ♂, 3 ♀, Lake Victoria, vi.1950 (*W. W. Macdonald*). KENYA: 1 ♂, 1 ♀, Naivasha, v.1918 and 1 ♂, Kabete, iv.1911 (*T. J. Anderson*). BELGIAN CONGO: long series from Parc National Albert; 7 ♂, 1 ♀, Elisabethville, xi.1933 (*C. Seydel*). N. RHODESIA: 2 ♀, Lusaka, ix.1955 (*A. E. King*). S. RHODESIA: 5 ♂, 14 ♀, Salisbury (*E. T. M. Reid*). TRANSVAAL: Series intermediate between *pictipennis* and *pilosimanus*, Olifantsvlei, nr. Johannesburg, ix.1954 (*A. D. Harrison*).

Chironomus (Dicrotendipes) fusconotatus Kieffer

(? *Dicrotendipes trilabis* Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 63).
Calochironomus fusconotatus Kieffer, 1922, *ibid.* **91** : 68.
Calochironomus griseonotatus Kieffer, 1922, *ibid.* **91** : 69.
Calochironomus griseosparsus Kieffer, 1922, *ibid.* **91** : 69.
Dicrotendipes forficula Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 298.
Dicrotendipes nilicola Kieffer, 1925, *ibid.* **1924** : 300 (SYN. NOV.).
Polypedilum quatuorpunctatum Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 489 (SYN. NOV.).

C. fusconotatus, *griseonotatus*, *griseosparsus* and *D. nilicola* were all described from females and seem to be re-descriptions of the same species, which was later more fully dealt with under the name *D. forficula*. *D. trilabis* is structurally identical and was described from the male, it differs from the others by the legs and wings being unmarked. I have seen teneral specimens from other parts of Africa with wing spots nearly absent and it seems likely that Kieffer had such a specimen before him but I am not adopting page precedence because there is some doubt over its identity; I am therefore treating *trilabis* as a probable synonym of *fusconotatus*. I have seen the type of *P. quatuorpunctatum* and can confirm that it is a teneral specimen of this species with only two of the dark spots developed on each wing; the posterior tibia has two spurs.

Wings spotted, all knees blackened, thorax with fairly heavy grey pruinosity which often masks the stripes; dorso-central bristles bi- or triserial; male hypo-

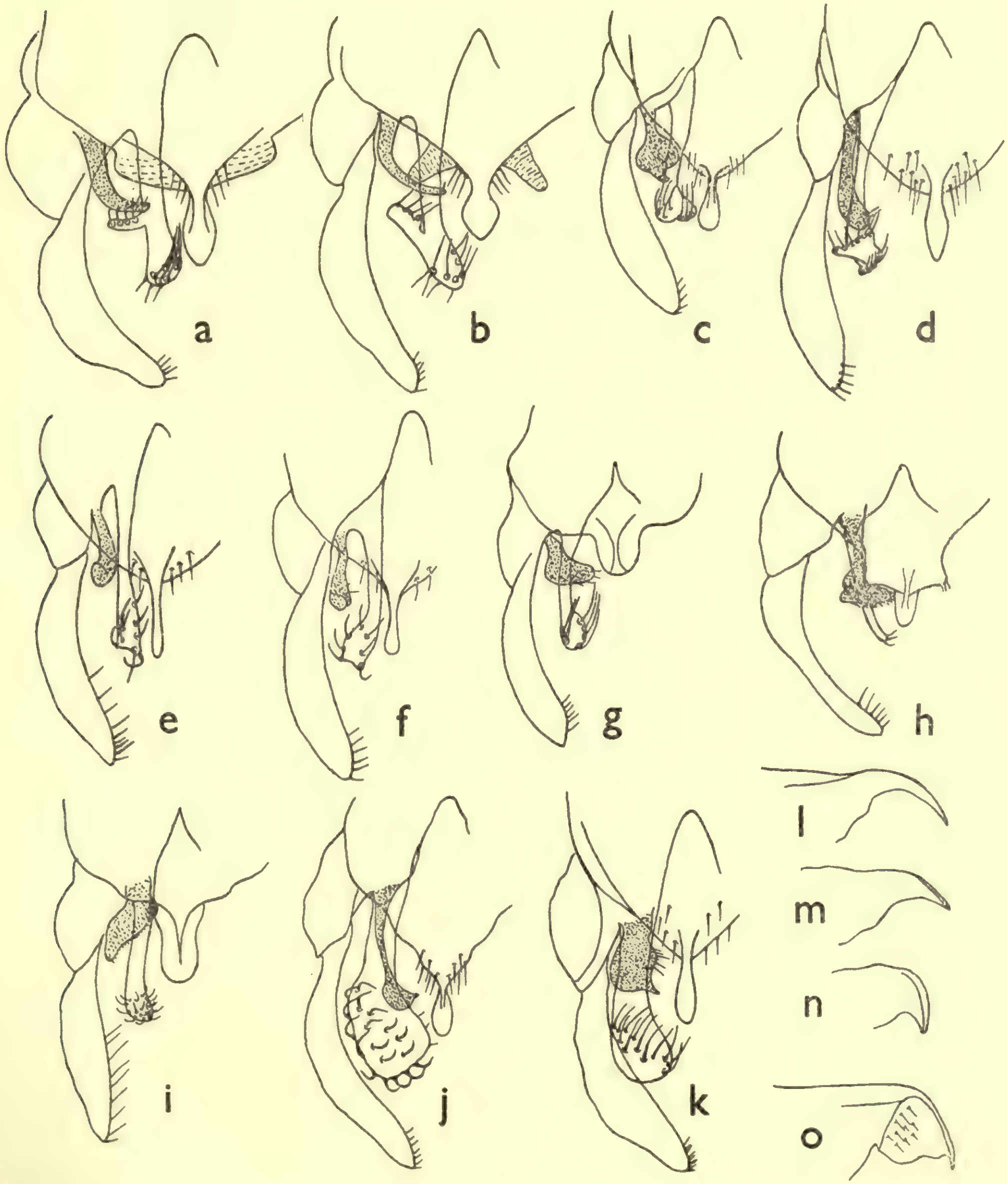

FIG. 7. Male hypopygia of *Chironomus* subg. *Dicrotendipes* ; (*a*)–(*k*) in dorsal aspect, (*l*)–(*o*) anal point in lateral aspect. (*a*) *C. pilosimanus* ; (*b*) *C. fusconotatus* ; (*c*) *C. cordatus* ; (*d*) *C. collarti* ; (*e*) *C. binotatus* ; (*f*) *C. chambiensis* ; (*g*) *C. kribiicola* ; (*h*) *C. bredoi* ; (*i*) *C. ealae* ; (*j*) *C. schoutedeni* ; (*k*) *C. nigrolineatus* ; (*l*) *C. binotatus* ; (*m*) *C. chambiensis* ; (*n*) *C. kribiicola* ; (*o*) *C. ealae*.

pygium with a membranous appendage on each side of the anal point, appendage 2 branched, the branch more apical than in *pilosimanus* and directed forwards. These characters separate it from *pilosimanus* but from *peringueyanus* it can only be separated by the presence of a spot in the fork cell (sometimes absent in teneral specimens) and by the less darkened fork veins; distinguished from *sudanicus* by the different wing pattern.

Male. Wing length 2–2·3 mm.

Head greyish-brown, palpi darker, frontal tubercles present, pedicel pruinose, A.R. about 3·5, plumes pale. *Thorax* with fairly strong grey pruinosity, often obscuring the stripes and postnotal and sternopleural markings which are dark brown; dorso-central bristles bi- or triserial at least posteriorly, pits darkened. *Legs* yellowish-green, all femora black tipped, all tibiae with black sub-basal ring and blackened at apex; anterior basitarsus and first 2 or 3 tarsal segments of other legs dark at apices, remainder of tarsal segments completely dark; anterior tarsi with slight beard on segments 2–3 in some specimens. *Wings* (Pl. 1, fig. *d*) normally with pattern of spots very similar to *pilosimanus* but main spot in centre of cell R_5 less clearly double, anal cell with one dark spot and two superposed lighter ones, posterior fork and Cu clouded. Specimens are often found with some or all of spots greatly reduced or even absent; *trilabis* has probably and *quatuorpunctatum* certainly, been described from such specimens. Halteres pale. *Abdomen* greenish, each segment with a central darkened area; hypopygium (Text-fig. 7, *b*) resembles that of *pilosimanus* but easily distinguished by a pair of membranous processes lateral to anal point; appendage 2 with branch forwardly projecting and arising nearer the apex, style less strongly curved.

Female resembles male in colour and pattern, abdomen rather darker. Antennae short, intermediate segments fusiform and without long necks, segment 6 equal to 4 and 5 together.

Type series of all species listed probably lost with exception of *quatuorpunctatum* which is in Musée Royal du Congo Belge (locality BELGIAN CONGO: Vitshumbi). Type locality of *trilabis* and *griseonotatus* SUDAN: south of Khartoum; of *fusconotatus* and *griseosparsus* SUDAN: between Wad el Zaki and Shabasha Shary; of *forficula* and *nilicola* EGYPT: Maadi.

DISTRIBUTION. I have seen numerous specimens from SUDAN: Khartoum and Wad Medani (*D. J. Lewis*) and near Assuan (*S. Hirst*) and from BELGIAN CONGO: Parc National Albert (*de Witte, Damas* and *Verbeke*). My only other record is UGANDA: Jinja (*Corbet* and *Macdonald*), but the species is probably common throughout East and Central Africa.

Chironomus (Dicrotendipes) peringueyanus Kieffer

Dicrotendipes peringueyanus Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1): 257; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2**: 372.

Polypedilum griseovittatum Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28**: 485 (SYN. NOV.).

In structure, including hypopygium, and general body colour indistinguishable from *fusconotatus*, only to be separated by the arrangement of the wing spots

(Pl. 1, fig. *e*) there being no spot in the fork cell whilst the fork veins are strongly clouded. The wing spots are slightly paler than in *fusconotatus* but the body colour is fully as dark; it may only be a variety of that species.

I have seen cotypes of *peringueyanus* from the South African Museum (locality CAPE PROVINCE: De Aar). I have also been able to study the holotype female of *Polypedilum griseovittatum* in the Musée Royal du Congo Belge (type locality BELGIAN CONGO: Parc National Albert); I can confirm that this has two spurs on the tibiae and belongs here and not to *Polypedilum*.

DISTRIBUTION. The following records are additional to previously published records from Cape Province, Orange Free State and Bechuanaland. N. RHODESIA: 1 ♀, Lusaka, ix–x.1955 (*A. E. King*). BELGIAN CONGO: 1 ♂, Kivu, Goma, x.1953 (*J. Verbeke*). KENYA: 1 ♀, Kisumu, in aeroplane, iii.1936 (*C. B. Symes*).

Chironomus (Dicrotendipes) sudanicus sp. n.

A small species with male hypopygium identical with that of *fusconotatus*. Separable from *pilosimanus*, *fusconotatus* and *peringueyanus* by the wing markings being over and along the veins and not as spots in the cells.

Male. Wing length 1·7 mm.

Head brown, palpi darker, frontal tubercles very small, A.R. about 2·5. *Thorax* similar in colour to *fusconotatus* but pruinosity on shoulders and prescutellar area more silvery and brighter, dorso-central bristles uniserial. *Legs* yellow; apex of anterior femur, base of anterior tibia and apices of all tibiae darkened, although darkening often quite faint; tarsi obscurely darkened towards apices of segments and in some specimens posterior femora obscurely darkened at apices; L.R. 1·75. *Wings* (Pl. 1, fig. *f*) with paler pattern than in previous species, no discrete spots in cells but clouds present over cross-vein, posterior fork and Cu and in anal angle; anal angle reduced in female but not in male. *Abdomen* almost completely dark with pale rings at the incisures, hypopygium similar to that of *fusconotatus*.

Female. Very similar to male, antennae of all specimens broken.

Holotype male, SUDAN: Adok; paratypes, SUDAN: 7 ♀, Melut; 2 ♀, Tonga; 1 ♀, Shambe (all coll. *E. T. M. Reid*, xi.1953); 1 ♂, Liednum nr. Wau, iii–iv.1955 (*E. T. M. Reid*); all specimens in British Museum. In addition, some specimens taken by J. Verbeke at Albertville, Lake Tanganyika, may belong here but they are larger and have black femora.

Chironomus (Dicrotendipes) cordatus Kieffer

Dicrotendipes cordatus Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 64; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 22.

Paratendipis pictus Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 199.

Chironomus (*Paratendipes*) *pictus* Freeman, 1954, *Arch. Hydrobiol.* **48** : 443.

Shining black; wings with heavy black transverse band and a large spot in anal cell; thorax with pruinose " bloom "; legs black, anterior basitarsi mostly white, other tarsi yellowish; hypopygium with appendage 1 broadened subapically, appendage 2 slightly bilobed at apex.

In wing markings and leg colour this species and the next two are very distinct from other African species and similar to the Samoan and Fijian species *C. melanocnemis* Edwards and *candidibasis* Edwards. I have been unable to distinguish *cordatus* and *collarti* satisfactorily except by using hypopygial characters, especially as *cordatus* seems variable in wing pattern, but *leucolabis* has a distinctive wing pattern and pale abdomen. It is possible that *cordatus* wing pattern is always more extensive than that of *collarti* but more specimens are needed to confirm the difference.

Male. Wing length 2–2·4 mm.

Head black, very small frontal tubercles present, antennae and plumes black, A.R. about 3. *Thorax* shining black or very dark brown, with pruinose "bloom" especially anteriorly and on pleura; dorso-central bristles uniserial and black, scutellum slightly paler in some specimens. *Legs* black or very dark brown, tibiae being particularly dark, trochanters and bases of femora yellowish, anterior basitarsus white on basal two-thirds or more, posterior 4 tarsi yellowish-white; L.R. 1·5. *Wings* (Pl. 1, fig. *g* and fig. *h* of female) with heavy black or dark brown markings with purplish reflections; the main marking is a broad transverse band the width of R_1 but variable in extent as shown; the second marking is a large spot in the anal cell; there is often though not always, a third spot anterior to the second in the basal cell and sometimes a longitudinal dark streak in this cell; all markings are subject to variation in size but the base of cell R_5 is always completely dark. Halteres black or dark brown. *Abdomen* black with either shining or pruinose bands at the incisures; segment 6 with 5–6 black spines ventrally. Hypopygium (Text-fig. 7, *c*) either black or with yellow styles; appendage 1 broadened subapically and with apex hooked, appendage 2 more or less cordiform or slightly bilobed at apex.

Female resembles male in colour although wing markings (Pl. 1, fig. *h*) are usually more extensive. Antennae with about 4–5 long hairs on each of segments 2–5, each being as long as segments 2–5 together, segments more or less fusiform, 6 as long as 4 and 5 together.

The type series of *cordatus* is probably lost (type locality, FRENCH CAMEROONS: Kribi), but I have seen the holotype male of *pictus* in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Kisantu).

DISTRIBUTION. SUDAN: 7 ♂, Khartoum, xi.1951 (*D. J. Lewis*); 7 ♂, Liednum, nr. Wau, iii–iv.1955 (*E. T. M. Reid*). UGANDA: 1 ♂, 1 ♀, Lake Nabugabo, xi.1934 (*F. W. Edwards*). TANGANYIKA: 1 ♂, Kware, Moshi, i.1952 (*E. Lindner*). BELGIAN CONGO: 1 ♂, Stanleyville (*Mouchet*); 1 ♀, Lac Eduard, Rutshuru, i.1936 (*H. Damas*). S. RHODESIA: 1 ♀, Salisbury, i.1900 (*G. A. K. Marshall*). The two type localities are in addition to these.

Chironomus (Dicrotendipes) collarti Goetghebuer

Chironomus (*Dicrotendipes*) *collarti* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 466.

The male is very similar to *cordatus* in colour and general structure; the wing markings (Pl. 1, fig. i) in the few specimens known to me are less extensive and absent from the basal cells, which may prove to be a specific character. Hypopygium (Text-fig. 7, *d*) white, appendage 1 of fairly even width, slightly swollen at apex, appendage 2 with definite fork at apex, the apical hairs are sharply divided into two groups, one to each branch. The female is not known.

I have seen the holotype male in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Ituri, Alokoko).

DISTRIBUTION. KENYA: 1 ♂, Aberdare Range, Chania Falls, 4,000 ft., x.1934 (*F. W. Edwards*). BELGIAN CONGO: 1 ♂, Katanga, Kafubu Mission, ix.1931 (*A. Mackie*); holotype, Ituri, Alokoko. NYASALAND: 1 ♂, Blantyre (*J.* B. *Davey*).

Chironomus (Dicrotendipes) leucolabis Kieffer

Dicrotendipes leucolabis Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 65.
Polypedilum aequatoris Goetghebuer, 1936, *Rev. Zool. Afr.* **28** : 482 (SYN. NOV.).

Structurally this species is very similar to *collarti*, the main point of separation being that appendage 1 of the male hypopygium is more swollen at the apex judging from Kieffer's figure. In colour, however, it is quite distinct from the previous two because the main body colour is brown rather than black, the thorax is slightly metallic with scutellum, postnotum and sternopleuron reddish, the legs are reddish-yellow with anterior tibia brown or pale centrally (basitarsus missing) and the abdomen yellowish, each segment with a narrow basal black band. The wing pattern is distinctive because the main wing band is distal to the apex of R_1 and covers the apex of R_{2+3} and extends beyond it, the basal half of cell R_5 is thus left clear; there is a quadrate spot in the anal cell and none in the basal cells.

The type of *leucolabis* is probably lost (type locality FRENCH CAMEROONS: Kribi) but I have seen Goetghebuer's specimen and can state that there are two spurs on the posterior tibia and that it definitely belongs to this genus and not to *Polypedilum*. Although it is a female, the wing pattern and colour of the body are sufficiently definite for it to be synonymized with *leucolabis*. Type locality of *aequatoris*, BELGIAN CONGO: Equateur, Flandria; no other specimens are known.

Chironomus (Dicrotendipes) binotatus Kieffer

Chironomus binotatus Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 354.
Chironomus seychelleanus Kieffer, 1911, *ibid.* **14** : 356 (in part).

Type specimens of both the above species are in the British Museum. The single specimen of *binotatus* is a male of a species very similar to, but slightly different from *chambiensis* Goetghebuer. *C. seychelleanus* is represented by a male of *C.* (*Chironomus*) *callichirus* Kieffer and a female conspecific with *binotatus*. As mentioned under *C. callichirus* I have fixed the specimen of that species as the lectotype and made the name a synonym by page priority.

C. binotatus is a small green species with reddish scutal stripes; the darker lateral stripes mentioned by Kieffer are due to irregular drying of the thoracic muscles. Thorax shining, anterior tibiae whitish and with black apices, male anal point long and curved, appendage 2 not as swollen as in *chambiensis*.

Male. Wing length 1·8–2·0 mm.

Head greenish-brown, antennae reddish-brown, A.R. about 2·0. *Thorax* shining, yellowish-green; stripes, postnotum and sternopleuron reddish-brown. *Legs* yellowish-brown, anterior femur dark at apex, anterior tibia whitish and with dark apex, L.R. nearly 2. *Wings* plain, halteres white. *Abdomen* plain green; hypopygium (Text-figs. 7, *e*, *l*) with anal point long and curved in side view, appendage 1 clubbed, appendage 2 long and narrow, not as swollen at apex as *chambiensis*.

Female resembles male in colour; antennal segments fusiform, last segment equal to 4 and 5 together.

Holotype male of *binotatus* and female cotype of *seychelleanus* in British Museum (type locality SEYCHELLES: Mahé).

DISTRIBUTION. Apart from the Seychelles specimens, I have seen PORTUGUESE EAST AFRICA: 1 ♂, Delagoa Bay, Lorenço Marques, iv.1920 (*W. C. C. Pakes*).

Chironomus (Dicrotendipes) chambiensis Goetghebuer

Chironomus (*Limnochironomus*) *chambiensis* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 464.

In colour, size and general structure extremely similar to *binotatus*, it differs by A.R. being about 2·5 (possibly variable), front legs more uniformly brown and thorax slightly pruinose. Main difference lies in male hypopygium (Text-figs 7, *f*, *m*) in which anal point is shorter, stouter and less curved and appendage 2 more strongly swollen at apex.

I have seen the holotype male in Museé Royal du Congo Belge (type locality BELGIAN CONGO: Kabasha, Chambi).

DISTRIBUTION. UGANDA: 1 ♂, Budongo Forest, ii.1935 (*F. W. Edwards*). BELGIAN CONGO: 1 ♂, Parc National Albert, Cratère Mugunga (*de Wulf*); 10 ♂, Elisabethville, xii.1938 (*H. J. Brédo*).

Chironomus (Dicrotendipes) kribiicola Kieffer

Phytochironomus kribiicola Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 152.

Not unlike *binotatus* and *chambiensis* but darker and halteres dark; male hypopygium quite different, anal point broad and downturned, appendage 1 short and more transverse so that genitalia more like *ealae* sp. n. I have not seen the holotype, but the genitalia and other characters are so similar that I am in no doubt over its identity.

Male. Wing length 1·6 mm.

Head dark brown, A.R. about 3. *Thorax* yellow, shoulders whitish, stripes, postnotum and sternopleuron dark brown. *Legs* brown, L.R. about 2. *Wings* quite unmarked, halteres with dark knobs. *Abdomen* dark brown (? possibly scorched at light); hypopygium (Text-figs. 7, *g*, *n*) quite characteristic, anal point short broad and strongly bent, appendage 1 short and with transverse head, appendage 2 not unlike *chambiensis*; styles narrow and curved.

Female not known.

Type probably lost, type locality FRENCH CAMEROONS: Kribi.

DISTRIBUTION. BELGIAN CONGO: 2 ♂, Eala, i.–ii.1935 (*J. Ghesquière*).

Chironomus (Dicrotendipes) bredoi Goetghebuer

Chironomus (*Chironomus*) *bredoi* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 473.

Very similar to *chambiensis* and *kribiicola* but more pruinose, pleura with distinct bluish " bloom ", male hypopygium peculiar and highly characteristic. In the original description, Goetghebuer confused appendages 1 and 2 so that his appendage 1 is really 2 and vice versa.

Male. Wing length 2·0 mm.

Head brown, pedicel pruinose, A.R. about 3·0 *Thorax* yellowish, shoulders paler; stripes, postnotum and most of pleura brown; thorax pruinose, pleura with distinct bluish " bloom " when viewed from the front. *Legs* yellowish, anterior knees broadly brown, L.R. 2; femora of front legs nearly twice as long as tibiae. *Wings* unmarked, halteres pale. *Abdomen* greenish-brown. Hypopygium (Text-fig. 7, *h*) quite characteristic; IXth tergite truncate, so that with anal point it appears trifid, appendage 1 with broad flat head and narrow finger-like lobe overlying it, appendage 2 very narrow and with about 3 short hairs at apex; styles narrow, slightly wider basally.

Female not known.

I have seen the holotype male in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Eala). Goetghebuer gives the length of the type as 7 mm. which is exaggerated even if the antennae are included; the wing length of the type is 2 mm. I have re-mounted the hypopygium of the type to confirm that Goetghebuer was in error in his interpretation of the appendages.

DISTRIBUTION. Apart from the holotype, I have seen one other specimen, from the same locality, ii.1935 (*J. Ghesquière*) in Institut Royal des Sciences naturelles de Belgique.

Chironomus (Dicrotendipes) ealae sp. n.

Green with yellow or reddish-yellow thoracic markings. Readily distinguished from similarly coloured species by the structure of the male hypopygium and the bearded male tarsi.

Male. Wing length 2·5 mm.

Head brown, frontal tubercles absent, A.R. about 2·5. *Thorax* whitish-green and slightly pruinose; stripes, postnotum and sternopleuron yellow or reddish-yellow. *Legs* with femora and tibiae of all legs whitish green, anterior tarsi bearded, L.R. about 1·25. *Wings* quite unmarked, halteres whitish-green. *Abdomen* green, unmarked. Hypopygium (Text-figs. 7, *i*, o) with broad, downturned anal point; appendage 1 variable in shape, rather fleshy and with numerous microtrichia, sometimes more or less mushroom-shaped, broader at apex; appendage 2 slightly enlarged at apex and with hairs evenly arranged, styles pointed.

Female not known.

Holotype male and paratype 1 ♂, NATAL: Howick, iv.1953 (*G. H. Satchell*) in British Museum; further paratypes, BELGIAN CONGO: 2 ♂, Eala, iv.v.1936 (*J. Ghesquière*) in Institut Royal des Sciences naturelles de Belgique; 1 ♂, Kalondo (Kivu), viii.1935 (*H. Damas*) in Institut des Parcs nationaux du Congo Belge.

Chironomus (Dicrotendipes) schoutedeni Goetghebuer

Chironomus (*Limnochironomus*) *schoutedeni* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 465.

Green with reddish scutal stripes; anterior tibiae brownish. Most easily distinguished from other green species by the structure of the male hypopygium in which appendage 2 is large and racket-shaped and appendage 1 long and thin with a swollen apex.

Male. Wing length 2·2–2·5 mm.

Head brownish-green, very small frontal tubercles present, antennae brown, A.R. 3·5. *Thorax* moderately shining, green; stripes, postnotum and sternopleuron reddish-yellow. *Legs* yellowish-green; apex of femur, tibia and tarsus of anterior legs brown, L.R. 1·75. *Wings* plain, very slightly darker at cross-vein in some specimens, halteres green. *Abdomen* plain green with dark hairs. Hypopygium (Text-fig. 7, *j*) with conical IXth tergite and downturned anal point; appendage 1 long and narrow, apex sharply enlarged and with an inwardly turned point; appendage 2 curved below as usual but enlarged and racket-shaped; styles narrow and curved.

Female not known.

I have seen the holotype male in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Boma).

DISTRIBUTION. DAHOMEY: 4 ♂, nr. Porto Novo, xii.1954 (*J. Hamon*). NIGERIA: 1 ♂, Beri, ix.1910 (*J. J. Simpson*). SUDAN: 4 ♂, Yirol, xii.1954 (*E. T. M. Reid*). BELGIAN CONGO: 1 ♂, Eala, iv.1936; 1 ♂, Musosa, x.1939; 1 ♂, Maka Lualaba, i.1939 (all coll. *H. J. Brédo*).

Chironomus (Dicrotendipes) nigrolineatus sp. n.

Green with reddish-yellow thoracic markings, central stripe marked with black, anterior tibia and tarsus blackish, male hypopygium characteristic. In colour and appearance this species resembles the *chloronotus-regalis* group of species but in hypopygial structure it is closer to *schoutedeni* and other green species.

Male. Wing length 3 mm.

Head greenish, frontal tubercles probably absent, palpi brown, antennae reddish, A.R. 3·5. *Thorax* green with stripes, postnotum and most of pleura reddish-yellow; central stripe with a median black stripe, apex of postnotum also blackish. *Legs* greenish, apex of anterior femur, entire tibia and tarsus darkened; L.R. nearly 2 anterior femur five-sixths length of basitarsus. *Wings* quite unmarked, halteres green. *Abdomen* plain green. Hypopygium as in Text-fig. 7, *k*; appendage 1 broad and with inwardly directed point at apex, appendage 2 rather stout but not broadened as in *latilobus*, styles slightly narrower at apex.

Female resembles male in colour and leg structure; antennal segments 3–5 with long necks, 6 equal to 4 and 5 together.

Holotype male and paratypes 16 females, BELGIAN CONGO: Elisabethville, xii.1932–iii.1933 (*C. Seydel*) all in British Museum.

Chironomus (Dicrotendipes) chloronotus Kieffer

Chironomus chloronotus Kieffer, 1911, *Proc. Linn. Soc. Lond.* (*Zool.*) **14** : 355.
Chironomus niloticus Kieffer, 1923, *Ann. Soc. ent. France,* **92** : 150 (SYN. NOV.).
Chironomus latilobus Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 384 (SYN. NOV.) ; Freeman, 1955, *South African Animal Life.* Uppsala, **2** : 371.
Chironomus henrardi Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 475 (SYN. NOV.).

This species shows considerable variation, not only in colour but also in the structure of the male hypopygium. The lectotype of *chloronotus* has a central dark band on the mesonotum, the abdomen plain and the hypopygium as in Text-fig. 8, *a*; in *henrardi* holotype the hypopygium and thorax are the same as this but the abdomen has black bands apically on the segments. *C. niloticus* was described from a specimen with the lateral thoracic bands blackish and the hypopygium as in Text-fig. 8, *b*; in the type of *latilobus* the hypopygium (Text-fig. 8, *c*) is not unlike *niloticus* but the thorax is totally pale; in both the abdomen is black-banded. Specimens taken at the same place on the same day and with identical hypopygia, falling into *latilobus*, may have banded abdomen and dark lateral thoracic stripes or the mesonotum and abdomen may be totally plain without black markings. In addition, there is some intergrading of hypopygial structure between all three groups.

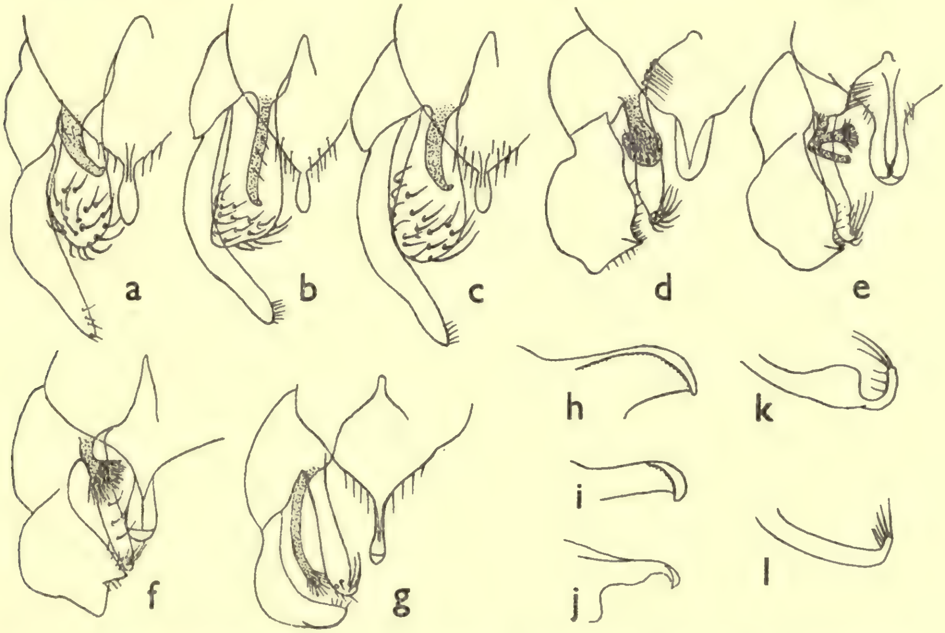

FIG. 8. Male hypopygia of *Chironomus* subg. *Dicrotendipes* ; (*a*)–(*g*) in dorsal aspect, (*h*)–(*j*) anal point in lateral aspect, (*k*)–(*l*) appendage 2 in lateral aspect. (*a*) *C. chloronotus* lectotype ; (*b*) *C. chloronotus* (*niloticus* form) ; (*c*) *C. chloronotus* (*latilobus* form) ; (*d*) *C. regalis* ; (*e*) *C. multispinosus* ; (*f*) *C. penicillatus* ; (*g*) *C. crispi* ; (*h*) *C. regalis* ; (*i*) *C. multispinosus* ; (*j*) *C. crispi* ; (*k*) *C. multispinosus* ; (*l*) *C. penicillatus.*

In my opinion the most satisfactory solution is to treat all as belonging to a single variable species. The type form hypopygium is found in Seychelles and Belgian Congo, *niloticus* particularly in the Sudan, *latilobus* in South, Central, East and West Africa.

Male. Wing length 2·5–3·5 mm.

Head yellowish-brown, small frontal tubercles present, A.R. about 3·5. *Thorax* green or yellow with reddish stripes, postnotum and sternopleuron; either central or lateral stripes, or occasionally all three overlaid with broad black stripes in most specimens; occasional specimens have no black markings; postnotum often blackish. *Legs* yellowish or greenish, anterior legs with apex of femur, entire tibia and tarsus darkened or blackish, tibiae may be paler centrally; L.R. about 1·9, anterior femur about 1·75 times as long as tibia. *Wings* unmarked, halteres pale. *Abdomen* either plain green or yellowish-green with apical third of each segment darkened. Hypopygium as mentioned above, rather variable (Text-figs. 8, *a–c*). In the commonest form which was described as *latilobus*, the styles are narrow, appendage 1 moderate and appendage 2 racket-shaped; in *niloticus* appendage 1 is sometimes longer and appendage 2 slightly pointed, these two forms intergrade; *chloronotus* has wider styles and slightly smaller appendage 2, but it is not always easy to be certain whether a given specimen fits *chloronotus* better than *latilobus*.

Female resembles male in colour except that all the specimens that I have seen have the abdomen plain. Antenna with segments 3–5 with long necks, segment 6 one and a half times as long as 5.

I have seen a male of the type series of *chloronotus* in the British Museum which I now fix as lectotype (type locality SEYCHELLES: Mahé). I have also seen the holotype of *latilobus* which is in South African Museum (type locality S. RHODESIA: Salisbury) and of *henrardi* in Musée Royal du Congo Belge (type locality BELGIAN CONGO: Nyangwe). Although the type of *niloticus* is probably lost, Kieffer's figure of the male hypopygium makes the species readily identifiable (type locality SUDAN: Shambe).

DISTRIBUTION. Apart from type material I have seen: SUDAN: 2 ♂, 7 ♀, Tonga, xi.1953 (*E. T. M. Reid*); 3 ♂, Yirol, vii.1954 (*E. T. M. Reid*). NIGERIA: 3 ♂, Onitsha, x.1932 (*Anderson*); 1 ♂, Lokoja (*C. F. Watson*). GOLD COAST: 1 ♂, Accra, vii.1916 (*J. W. S. Macfie*); 1 ♂, Nangodi, x.1954 (*G. Crisp*). FRENCH WEST AFRICA: 10 ♂, 1 ♀, Bobo Dioulasso (Haute Volta), vii–ix.1956 (*J. Hamon*). DAHOMEY: 11 ♂, 3 ♀, Porto Novo (*J. Hamon*). UGANDA: 2 ♂, L. Mgogo, Ankole. ii.1912 (*R. E. McConnell*); 2 ♂, 3 ♀, L. Victoria (*W. W. Macdonald*). KENYA: 1 ♂, Mt. Elgon, Kapretwa (*F. W. Edwards*). BELGIAN CONGO: 6 ♂, 1 ♀, Eala (*J. Ghesquière*); 3 ♂, 8 ♀, Maka Lualaba, i.1939 (*H. J. Brédo*); 1 ♂, 5 ♀, Elisabethville (*H. J. Brédo*); 1 ♂, Bambesa, vii.1943 (*J. Vrydagh*); 1 ♂, Flandria (*R. P. Hulstaert*); 1 ♂, Bassin Lukuga (*H. de Saeger*). NYASALAND: 1 ♀, Mt. Mlanje, xii.1912 (*S. A. Neave*). NATAL: 1 ♂, Richard's Bay, vii.1930 (*B. de Meillon*). CAPE PROVINCE: 1 ♀, Mossel Bay, ii.1922 (*R. E. Turner*); 1 ♂, Grahamstown, iii.1953 (*G. Satchell*). S. W. AFRICA: 2 ♂, 3 ♀, Ovamboland, ix.1934; 1 ♂, Kaokoveld, Ohopoho, vi.1951 (*P. Brinck*).

Chironomus (Dicrotendipes) regalis Goetghebuer

Chironomus (*Carteria*) *regalis* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 465 (not *Carteria regalis* Freeman, 1955—see *penicillatus* sp. n. below).

Thorax with longitudinal black stripe from front to postnotum; L.R. 2·2, knees blackened, abdomen with black bands; male styles broad and with inwardly directed point, anal point deep in side view, appendage 1 large, simple, and turned up at apex. Most easily separated from the following three species by the male genital structure, although *multispinosus* can be distinguished by the arming of the posterior tibial combs.

Male. Wing length 2·5–3·0 mm.

Head yellowish-brown, frontal tubercles indistinguishable, A.R. about 3. *Thorax* yellowish, stripes slightly darker, line of acrostichal bristles covered by a black or dark brown longitudinal stripe extending from front of thorax right back over scutellum and postnotum. *Legs* yellow, all knees blackish, anterior ones more broadly so, anterior tibiae dark apically as well, L.R. about 2·2; posterior tibial combs normal, each with one spur. *Wings* plain, unmarked, halteres pale. *Abdomen* yellowish, each segment darkened on posterior half or third and occasionally more or less on the mid-line as well. Hypopygium (Text-figs. 8, *d*, *h*) with broad anal point which is deep in side view; styles broad and of irregular outline, with a blackened point on inner margin; appendage 1 usually broadened subapically and upturned, clothed with fine hairs; basal to appendage 1 is a brush of hair; appendage 2 similar to *multispinosus* (Text-fig. 8, *k*), swollen subapically and with extremity bent upwards and carrying a few hairs.

Female. Resembles male although central dark thoracic stripe is rather wider; abdomen similarly marked but these markings disappear in most dried specimens; antennae with segments 3–5 with slight necks, 6 equal to 4 and 5 together.

I have seen the holotype male in Musée Royal du Congo Belge (type locality BELGIAN CONGO, between Coquilhatville and Bumbo).

DISTRIBUTION. SIERRA LEONE: 1 ♀, Mabang, ix.1924 (*E. Hargreaves*). GOLD COAST: 6 ♂, Adidomi (*N. L. Braybrock*). BELGIAN CONGO: 1 ♀, Coquilhatville, ix.1910 (*A. Y. Massey*); 1 ♂, Stanleyville (*Mouchet*); 1 ♂, Lualaba R., Kabale, ix.1931 (*D. A. Cockerell*); 1 ♂, Boma, viii.1938 (*Nicolay*); 4 ♂, Eala (*J. Ghesquière*); 4 ♂, Mareba, viii.1911 (*Meuleman*).

Chironomus (Dicrotendipes) multispinosus sp. n.

In colour, general appearance and structure similar to *regalis*. Easily distinguished in both sexes by the peculiar inner comb of the posterior tibia which bears either 4 or 5 spurs evenly arranged around it, so that the tibia bears either 5 or 6 spurs altogether; this character is consistently shown by all eight specimens examined; combs of middle tibiae normal, each with one spur.

Male hypopygium equally characteristic (Text-figs. 8, *e*, *i*, *k*); anal point much narrower in side view than *regalis*, styles more rounded at apex, although this may not be constant; appendage 1 bifid, one branch with a brush of hair at apex, basal hair brush present; appendage 2 similar to *regalis*.

Holotype male, UGANDA: Lake Bunyoni, viii.1932 (*G. H. E. Hopkins*) in British Museum; paratypes, BELGIAN CONGO: 3 ♂, Eala (*J. Ghesquière*); 3 ♀, Flandria, ii.1929 (*R. P. Hulstaert*); 1 ♀, Lac Kibuga, S. Rutshuru, vii.1935 (*H. Damas*). FRENCH W. AFRICA: 3 ♂, Haute Volta, Banfora, xii.1956 (*J. Hamon*). Three paratypes returned to Musée Royal du Congo Belge, two to Institut Royal des Sciences naturelles de Belgique, two to O.R.S.T.O.M., remainder in British Museum.

Chironomus (Dicrotendipes) penicillatus sp. n.

Carteria regalis Freeman, 1955, *S. Afr. Animal Life.* Uppsala **2** : 371 (not Goetghebuer, 1936).

This species is again very similar to *regalis*. Antennal ratio about 2·5; thoracic markings as in *regalis*, legs perhaps darker, L.R. no more than 1·75, spurs normal; abdomen darker, only basal third of segments 2–5 obscurely pale. Hypopygium distinctive (Text-figs. 8, *f*, *l*); anal point narrow in side view, as in *multispinosus* (Text-fig. 8, *i*); styles with sharper and more angular outlines; appendage 1 simple and with dense brush of hair at apex, basal brush absent; appendage 2 not swollen subapically.

Holotype male, CAPE PROVINCE: Betty's Bay, i.1956 (*K. M. F. Scott*) in British Museum; paratypes, 5 ♂, 1 ♀, Cape Peninsular, Hout Bay, Skoorsteenkop, ii.1951 (*P. Brinck*)—two males retained in British Museum, remainder returned to Lund University collection.

Chironomus (Dicrotendipes) crispi sp. n.

Extremely similar to *regalis* in colour and appearance, although the type specimens are slightly smaller (wing length 2·2 mm.), posterior tibial combs with the normal single spur each; separable from *regalis* and allied species by the structure of the male hypopygium (Text-figs. 8, *g*, *j*). Anal point much narrower, hooked in lateral aspect, styles of peculiar appearance, strongly bent, intermediate in form between *regalis* and a species such as *chloronotus*; appendage 1 long, narrow and hairy at the apex; appendage 2 similar to *penicillatus*, bent upwards at apex and without subapical enlargement.

Holotype male and paratypes 3 ♀, GOLD COAST: Red Volta, Nangodi, x.1954 (*G. Crisp*); further paratypes: NIGERIA: 1 ♂, 1 ♀, Funtua, x.1956 (*B. McMillan*). SUDAN: 1 ♂, Wau, x.1952 and 1 ♂, Adok, xi.1953 (*E. T. M. Reid*). All specimens are in the British Museum.

Chironomus MEIGEN SUBGENUS ***Nilodorum*** KIEFFER

Nilodorum Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 272; Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 30 and 1922, *ibid.* **91** : 45; Kieffer, 1925, *Bull. Soc. ent. Égypte*, **1924** : 296; Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 196; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 19; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 372; Freeman, 1956, *Bull. I.F.A.N.* **18** : 94.

Chironomus subg. *Nilodorum* Edwards, 1931, *Dipt. Patagonia S. Chile*, **2** : 320; Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 464.

Chironomus subg. *Chironomus* Goetghebuer, 1936, *ibid.* **28** : 470 (in part).

Tendipes subg. *Nilodorum* Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Region*, **3** (13*c*) : 34.

Frontal tubercles absent, mouthparts and palpi greatly reduced, palp segments usually only twice as long as wide, occasionally 4–5 times as long as wide, antennae thick, plumes very bushy; prothorax reaching up to front of thorax but divided as in *Dicrotendipes*; thorax smooth and rounded in lateral aspect and heavily pollinose, usually without silvery pruinosity, bristles short, pale and inconspicuous; anterior tarsi of male usually heavily bearded; wings plain, cross-vein may be darkened; male hypopygium with both appendages 1 and 2 fully developed, appendage 2 very large, often racket shaped, styles hardly contracted apically.

The smooth rounded appearance of the thorax with its thick dull grey pollinose coating, combined with the short palpi and mouthparts, makes this subgenus easy to recognize. However, *fractilobus* Kieffer is not completely typical and tends to link the subgenus with *Dicrotendipes*, also *nigropunctatum* sp. n. shows some silvery pruinosity on the shoulders, so that it is not practical to treat it as a full genus.

Kieffer, Goetghebuer and myself have described from Africa 12 species and two varieties which are correctly to be placed in *Nilodorum*. Most of these are synonyms, and, in fact, I am only able to recognize five species, one of which is new.

KEY TO AFRICAN SPECIES OF *Chironomus* SUBG. *Nilodorum*

1. Thorax quite smooth and unmarked 2
   Mesonotum either wrinkled on anterior half or with four transverse black spots . 4
2. Colour dark, abdomen with pale incisures; male tarsal beard reduced and only slightly developed; hypopygium with appendage 2 more elongate (Text-figs. 9, *c*, *g*) . . . . *fractilobus* Kieffer
   Colour paler, especially in male, abdomen of male usually pale or pale with dark markings; beard fully developed; hypopygium with appendage 2 wider . . 3
3. Appendage 2 of male hypopygium oval or nearly oval (Text-fig. 9, *a*) *brevibucca* Kieffer
   Appendage 2 angular and strongly emarginate at apex (Text-figs. 9, *b*, *f*) *brevipalpis* Kieffer
4. Mesonotum without dark spots but strongly wrinkled on anterior half *rugosum* nom. nov.
   Mesonotum not wrinkled but with a transverse row of four dark spots in the male (female not known) . . . . *nigropunctatum* sp. n.

Chironomus (Nilodorum) brevibucca Kieffer

Nilodorum brevibucca Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 45; Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 196; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 19.

Nilodorum brevibucca var. *stilatum* Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 46; Kieffer, 1925, *Bull. Soc. R. ent. Égypte* **1924** : 296.

Nilodorum brevibucca var. *caffrarium* Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 38.

Nilodorum nigritarse Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 197 (SYN. NOV.).

Nilodorum burgeoni Goetghebuer, 1935, *ibid.* **26** : 398 (SYN. NOV.).

Chironomus (*Nilodorum*) *burgeoni* Goetghebuer, 1936, *ibid.* **28** : 464.

Chironomus (*Nilodorum*) *nigritarsis* Goetghebuer, 1936, *ibid.* **28** : 464.

The smooth grey evenly rounded thorax, combined with the strongly bearded front tarsi and racket-shaped appendage 2 of the male, make this one of the most easily recognized African species of the family. It can only be distinguished from *brevipalpis* with certainty by the structure of the male hypopygium.

I have not seen the type of *brevibucca* which is probably lost, but the species can be easily recognized from the description; I can see no reason for maintaining *stilatum* as a distinct variety. I have seen the type specimens or series of the other three names all of which are normal specimens of *brevibucca*. They were all described from pinned specimens and would thus appear darker and with full pollinosity, whereas the type of *brevibucca* being in spirit would have the thoracic pollinosity masked and the whole insect would appear lighter and with pale stripes on the mesonotum.

Male. Wing length 3–4·5 mm.

Head yellowish-grey, frontal tubercles absent, pedicel brown, A.R. between 5 and 6, flagellum rather thick, plumes bushy and white or pale brown; palpi short, segments not more than twice as long as wide. *Thorax* smooth grey and rounded in outline, completely covered in grey pollinosity; stripes darker and just visible, postnotum and sternopleuron also darker; dorso-central bristles small, pale and inconspicuous, uniserial and only properly developed on posterior half of thorax; marginal bristles of scutellum pale and weak. *Legs* yellowish-green, apex of anterior femur, apices of all tibiae, anterior tarsal segments 2–5, darkened; in darker specimens anterior tibiae may be more generally darkened and the other femora may be darker apically; L.R. about 1·2, anterior tarsus with long and strong beard on segments 2–4. *Wings* with darkened cross-vein, halteres pale. *Abdomen* may be quite plain yellowish-green or each segment may carry a dark marking or the abdomen may be mostly dark, all intermediates occur. Hypopygium (Text-fig. 9, *a*) with broad IXth tergite and evenly enlarged appendage 2.

Female much darker than male; thorax dark grey, markings darker, dorso-central bristles partially biserial; knees more strongly darkened, beard absent; abdomen quite dark and with pruinosity or pollinosity; antennae with last segment longer than 4 and 5 together, 3–5 more or less fusiform.

Types of *brevibucca* and var. *stilatum* probably lost (type locality SUDAN: Shambe). Cotypes of var. *caffrarium* in South African Museum (locality S. RHODESIA: Salisbury). Holotypes of *nigritarse* (locality BELGIAN CONGO: Katana) and *burgeoni* (BELGIAN CONGO: Kamande) both in Musée Royal du Congo Belge.

DISTRIBUTION. Common and widely distributed; I have seen abundant material from the following localities. EGYPT: Fayoum. SUDAN: Khartoum, Adok, Yirol. GABOON: L. Asebb. SÉNÉGAL: Dakar. UGANDA: Jinja, Bukumi. BELGIAN CONGO: Parc National Albert. N. RHODESIA: L. Bangweulu. S. RHODESIA: Salisbury. NATAL: Pietermaritzburg. ORANGE FREE STATE: Harrismith, Zastron.

Chironomus (Nilodorum) brevipalpis Kieffer

Chironomus brevipalpis Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 69.

Nilodorum dewulfi Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 196 (SYN. NOV.) ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 20 ; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 372.

Chironomus (*Nilodorum*) *dewulfi* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 464.

Chironomus (*Chironomus*) *surdellus* Goetghebuer, 1936, *ibid.* **28** : 478 (SYN. NOV.).

Chironomus (*Chironomus*) *vitshumbiensis* Goetghebuer, 1936, *ibid.* **28** : 479 (SYN. NOV.).

I have seen a cotype of *brevipalpis* and holotypes of the other three species and can confirm their synonymy. It is not clear why Goetghebuer described the last two species both in the same paper and in the wrong subgenus, especially as the male hypopygium is so characteristic and both bear identical data.

It is very similar to *brevibucca* and can only be separated with certainty by examining the male hypopygium (Text-fig. 9, *b, f*) in which appendage 2 is more or less square when seen laterally and is emarginate distally. It is on the average

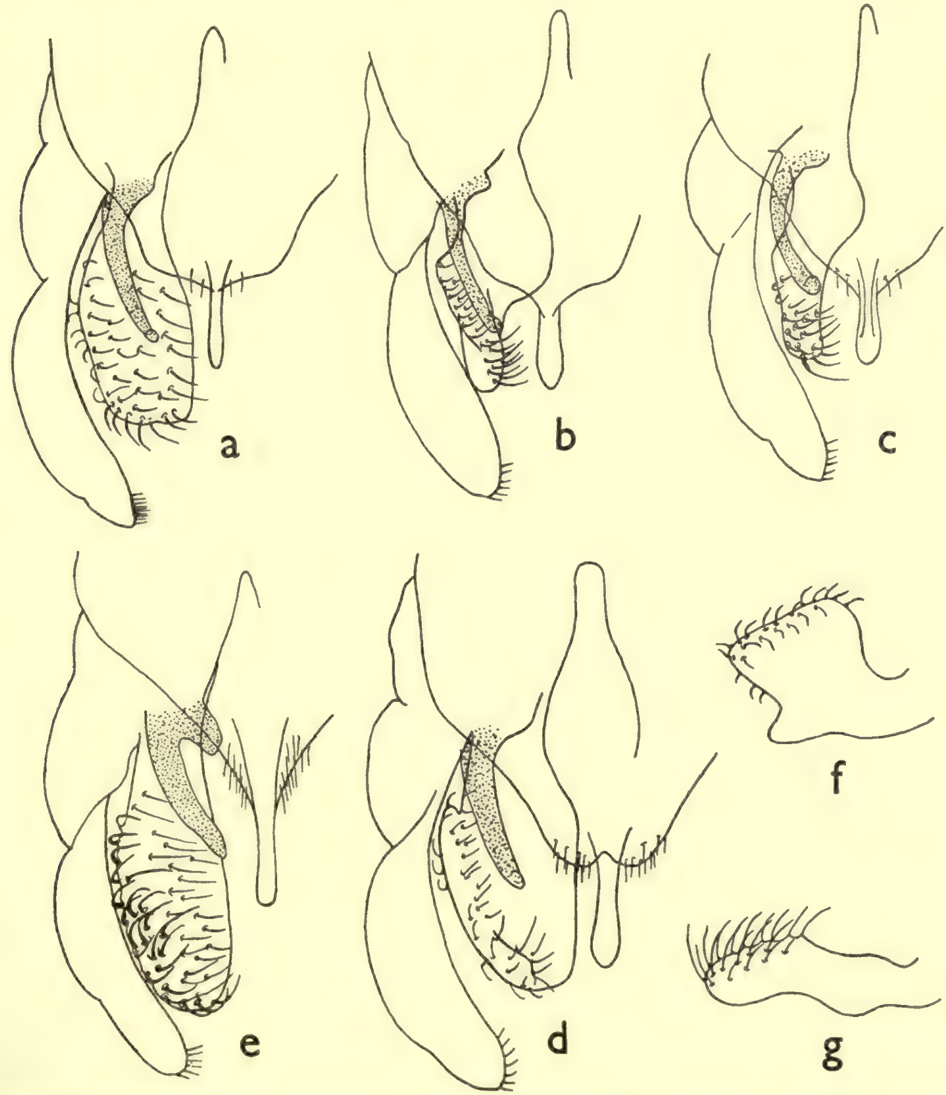

FIG. 9. Male hypopygia of *Chironomus* subg. *Nilodorum*; (*a*)–(*e*) in dorsal aspect, (*f*)–(*g*) appendage 2 in lateral aspect. (*a*) *C. brevibucca*; (*b*) *C. brevipalpis*; (*c*) *C. fractilobus*; (*d*) *C. rugosum*; (*e*) *C. nigropunctatum*; (*f*) *C. brevipalpis*; (*g*) *C. fractilobus*.

smaller (wing length 2·5–4 mm.) and paler in colour, the abdomen being unmarked in the male; male tarsal beard not as strong as in *brevibucca* but much stronger than in *fractilobus*. Females of *brevipalpis* and *brevibucca* very similar.

Cotypes of *brevipalpis* in Hungarian National Museum (type locality ETHIOPIA: L. Dembel). Holotypes of the other three in Musée Royal du Congo Belge; type localities BELGIAN CONGO: Katana (*dewulfi*); P.N.A., Vitshumbi (*surdellus* and *vitshumbiensis*).

DISTRIBUTION. I have seen series from SUDAN: Yirol; UGANDA: Jinja; BELGIAN CONGO: Parc National Albert; S. RHODESIA: Salisbury; and SOUTH WEST AFRICA: Kaokoveldt.

Chironomus (Nilodorum) fractilobus Kieffer

Phytochironomus fractilobus Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 151.
Chironomus (*Chironomus*) *caligans* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 473 (SYN. NOV.).
Nilodorum elongatum Freeman, 1955, *Explor. Parc Nat. Upemba*, Miss. de Witte, fasc. **35** (6) : 98 ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fac. **83** : 20 (SYN. NOV.).

The identity of this species is now clear from Kieffer's figure of the male hypopygium; appendage 2 in Goetghebuer's figure is very poorly represented. It is a comparatively small dark species with hypopygial structure not unlike *brevipalpis*, but appendage 2 is more elongate and narrow; separable from both *brevipalpis* and *brevibucca* by its longer palpi and reduced tarsal beard.

Male. Wing length 2·75–3·0 mm.

Head brown, A.R. about 4; palpi rather longer than is usual in the subgenus, segment 2 about five times as long as broad, segments 3 and 4 subequal to it. *Thorax* dark grey, pollinosity not as striking as in other species, stripes hardly distinguishable, dorso-centrals uniserial. *Legs* pale brown, knees rather darker, anterior tibiae may be blackish on basal half and at apex, L.R. 1·4, anterior tarsi with short beard only, mostly on segment 3. *Wings* hyaline, cross-vein darkened, halteres pale. *Abdomen* brown with pale incisures; hypopygium (Text-figs. 9, *c*, *g*) rather similar to *brevipalpis* but appendage 2 quite different, especially when seen in lateral aspect.

Female generally similar to male but abdomen darker and unbanded, legs more distinctly marked with black at the knees and apices of tibiae.

Type series of *fractilobus* probably lost (type locality SUDAN: Shambe). I have seen holotype male of *caligans* in Musée Royal du Congo Belge (locality BELGIAN CONGO: Vitshumbi); the holotype male of *elongatum* is in Institut des Parcs Nationaux du Congo Belge (locality BELGIAN CONGO: L. Upemba, Mabwe).

DISTRIBUTION. Apart from material from type localities of *caligans* and *elongatum* I have seen SUDAN: series from Yirol, Rumbek, Juba and Tonga (*E. T. M. Reid*). NATAL: 1 ♂, Pietermaritzburg, xi.1954 (*B. Stuckenberg*).

Chironomus (Nilodorum) rugosum nom. nov.

Nilodorum albitarse Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 46 ; Freeman, 1956, *Bull. I.F.A.N.* **18** : 94 (not *Chironomus albitarsis* Lundstroem, 1913, *Acta Soc. Fauna Fenn.* **30**, No. 10 : 14).
? *Nilodorum magna* Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 47.

Easily recognized by the large size, the wrinkling of the anterior part of the mesonotum and by the male hypopygium, in which the IXth tergite is bilobed at the apex.

I am in no doubt about the identity of *albitarse* although the type is probably lost but I am not so certain about *magnum*. Both species were collected in the same locality in the same month and I think it is probable that *magnum* is simply a paler form of *albitarse*, the main difference being that only the knees are broadly dark in the female instead of the whole femur and tibia. Exact identification must await further collecting. The name *albitarse* becomes a homonym with the downgrading of *Nilodorum* to a subgenus; owing to the doubtful position of *magnum* I have preferred to choose a new name.

Male. Wing length 4–4·5 mm.

Head grey, palpi short, each segment about twice as long as broad, frontal tubercles absent, antennae thick, plumes very bushy and pale, A.R. about 5. *Thorax* grey and thickly covered with pollinosity, anterior part of mesonotum with transverse wrinkles; stripes, postnotum and sternopleuron brown but markings scarcely visible through the pollinosity; dorso-central bristles uniserial. *Legs* yellow and without markings except at apices of tarsal segments; L.R. scarcely 1·1, anterior tarsi with strong and well formed beard on segments 2–4. *Wings* with cross-vein darkened, halteres pale. *Abdomen* brownish-green, without dark markings; hypopygium (Text-fig. 9, *d*) with IXth tergite bilobed at apex, appendage 2 large and curved upwards laterally, hairs reduced in number and short.

Female resembles male in wrinkling of thorax, but much darker in colour. Whole body a dark grey over a darker cuticle, femora and tibiae dark brown, tarsi pale with extreme apices of segments darkened, femora sometimes paler basally.

The type of females of both species appear to be lost (locality of both SUDAN: Shambe).

DISTRIBUTION. SUDAN: 1 ♀, Shambe and 1 ♀, Adok, xi.1953 (*E. T. M. Reid*); 1 ♀, Yirol, vi–vii.1954 (*E. T. M. Reid*); 1 ♂, 1 ♀, Liednum, nr. Wau, iii–iv.1955 (*E. T. M. Reid*). UGANDA: 5 ♀, L. Victoria, Bukoba, i.1955 (*P. S. Corbet*). NIGERIA: 15 ♂, Gadau, iv.1933 (*D. J. Lewis*); 1 ♂, Onitsha, (*V. B. Wigglesworth*). GAMBIA: 1 ♂ (*Hopkinson*). FRENCH SUDAN: 2 ♀, Macina (*Th. Monod*).

Chironomus (Nilodorum) nigropunctatum sp. n.

A very large species, male thorax grey with four dark spots across the middle, shoulders with some silvery pruinosity; abdomen with a vague central brown line, knees pale, IXth tergite of male conical, appendage 1 with an extra lobe at the base. Superficially it resembles *C.* (*Chironomus*) *tetraleucus*.

Male. Wing length 6 mm.

Head brownish-yellow, palpi perhaps slightly longer than in *brevibucca*, segments 2–4 about three times as long as wide, frontal tubercles absent; antennae thick, plumes bushy and pale, A.R. about 6. *Thorax* with yellowish background thickly overlaid with pollinosity, main part of stripes, postnotum and sternopleuron hardly darker; each central stripe with a comma-shaped dark spot at its posterior end, each lateral stripe with a small oval blackish spot at its anterior end, together making a row of four dark spots across the centre of the mesonotum; lateral margins of lateral stripes with a dark streak as well; dorso-central bristles biserial and extending further forwards than usual; anterior part of line of bristles and oval spot on shoulders lacking grey pollinosity but with silvery shimmering pruinosity; scutellum with several rows of short pale hairs. *Legs* thick and hairy, pale yellow, anterior knees vaguely darker, anterior tarsi missing in the only known specimen, other tarsi with segments darker at apex. *Wings* with cross-vein slightly darkened, halteres pale. *Abdomen* yellowish with silvery pruinosity and with a vague central brown line. Hypopygium (Text-fig. 9, *e*) distinguished from other species by conical IXth tergite, long anal point, oval and very hairy appendage 2 and more or less branched appendage 1.

Female not known.

Holotype male, TRANSVAAL: Pretoria, iii.1914 (*J. Brincker*) in British Museum.

Chironomus MEIGEN SUBGENUS ***Xenochironomus*** KIEFFER

Xenochironomus Kieffer, 1921, *Bull. Soc. Hist. nat. Moselle*, **29** : 69 ; Townes, 1945, *Amer. Midl. Nat.* **34** : 91 (in part).

Chironomus subg. *Chironomus* Group B, Series 3, Edwards 1929, *Trans. ent. Soc. Lond.* **77** : 385.

Chironomus subg. *Xenochironomus* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 468 ; Freeman, 1955, *Explor. Parc nat. Albert*, Miss. de Witte, fasc. **83** : 16.

Frontal tubercles absent, palpi fully developed, prothorax reaching up to front of thorax, but divided by a suture as in *Dicrotendipes*, thorax not pruinose, body colour green, wings unmarked, male hypopygium with appendage 1 reduced to a small pubescent lobe, appendage 2 well formed, anal point broad, deep in lateral aspect.

This subgenus is intermediate between *Dicrotendipes* and *Cryptochironomus*, the important feature being the reduction of appendage 1 whilst appendage 2 is retained. The broad and deep anal point is also shown to a lesser extent by *C.* (*Dicrotendipes*) *satchelli*. It is probable that the North American species placed by Townes (1945) in *Xenochironomus* should mostly be placed in *Dicrotendipes*. There are two African species known.

KEY TO AFRICAN SPECIES OF *Chironomus* SUBG. *Xenochironomus*

Anal point of male very deep in lateral aspect, appendage 2 narrow and with 2–3 hairs at apex (Text-figs. 10, *b*, *d*) . . . . *trisetosus* Kieffer

Anal point less deep in lateral aspect, appendage 2 racket-shaped, although sometimes appearing narrow because viewed edge-on, with about 12 hairs (Text-figs. 10, *a*, c) . . . . *ugandae* Goetghebuer

Chironomus (Xenochironomus) ugandae Goetghebuer

Chironomus (*Xenochironomus*) *ugandae* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 468.

Chironomus (*Xenochironomus*) ? *ugandae* Freeman, 1955, *Explor. Parc nat. Albert*, Miss. de Witte, fasc. **83** : 16 ; Freeman, 1955, *Explor. Parc nat. Upemba*, Miss. de Witte, fasc. **35** (6) : 98.

Goetghebuer described this species as brown with black brown thoracic stripes and greenish abdomen, but his holotype is in very poor condition and this may account for its dark colour, or it may have been scorched at light. My specimens, which have hypopygia identical to his, are green with reddish thoracic stripes. The thick anal point, reduced appendage 1 and racket-shaped appendage 2 make the male easy to recognize; it is doubtful whether the female can be separated from other similarly coloured species.

Male. Wing length 2·3–2·5. mm.

Head, mouthparts and palpi green or yellowish, frontal tubercles absent, pedicel reddish, A.R. 2·75. *Thorax* green or yellowish; stripes, apex of postnotum and sternopleuron reddish-yellow. *Legs* green, anterior tibiae dark at least at base and apex, apex of femur sometimes similarly coloured, all tarsi brown; L.R. about 1·3, beard absent. *Wings* with cross-vein hardly darkened, halteres pale. *Abdomen* green, unmarked. Hypopygium (Text-figs. 10, *a*, *c*) with broad anal point which is strongly bent downwards at apex, appendage 1 greatly reduced and with a few hairs, appendage 2 racket-shaped, in many specimens more or less tilted so that it is seen edge-on and appears much narrower.

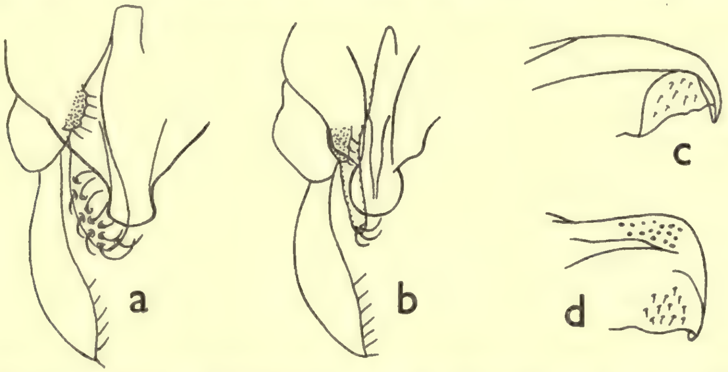

FIG. 10. Male hypopygia of *Chironomus* subg. *Xenochironomus* ; (*a*)–(*b*) in dorsal aspect, (*c*)–(*d*) anal point in lateral aspect. (*a*) *C. ugandae* ; (*b*) *C. trisetosus* ; (*c*) *C. ugandae* ; (*d*) *C. trisetosus*.

Female not identified with certainty, but probably similar in colour and pattern to male.

I have seen the holotype male in Musée Royal du Congo Belge (type locality UGANDA: Namasagali).

DISTRIBUTION. SUDAN: 4 ♂, Adok, xi.1953 (*E. T. M. Reid*). UGANDA: holotype. BELGIAN CONGO: 29 ♂, Kivu, Goma (*J. Verbeke*); 3 ♂, Ituri, Lake Albert, ii.1953 (*J. Verbeke*); 6 ♂, Parc National Albert (*de Witte* and *Damas*); 1 ♂, Parc National de l'Upemba (*de Witte*).

Chironomus (Xenochironomus) trisetosus Kieffer

Cladopelma trisetosum Kieffer, 1922, *Ann. Soc. ent. France*, **92** : 54.

I have only been able to separate this species from *ugandae* by the very characteristic structure of the male hypopygium (Text-figs. 10, *b*, *d*). Anal point excessively deep and tall in side view, appendage 2 narrow and finger-like with only 2–3 hairs at the apex, styles and the greatly reduced appendage 1 similar to *ugandae*.

I have not seen the type which is probably lost (type locality SUDAN: south of Khartoum). Kieffer's figure of the male hypopygium is sufficient for the identification of the species.

DISTRIBUTION. SUDAN: 5 ♂, Melut, xi.1953 (*E. T. M. Reid*). BELGIAN CONGO: 1 ♂, Kivu, Ile Wahu and 27 ♂, Albertville (*J. Verbeke*).

Chironomus MEIGEN SUBGENUS ***Cryptochironomus*** KIEFFER

Cryptochironomus Kieffer, 1918, *Ent. Mitt.* **7** : 46 ; Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 153 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 282 ; Townes, 1945, *Amer. Midl. Nat.* **34** : 96 ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 16.

Nilomyia Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 270 ; Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 27 (SYN. NOV).

Kribiocryptus Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 270 ; Kieffer. 1921, *Ann. Soc. ent. France*, **90** : 28.

Cladopelma Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 274 ; Kieffer, 1921, *Bull. Soc. Hist. nat. Moselle*, **29** : 63 ; Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 31 ; Kieffer, 1922, *ibid.* **91** : 50 ; Harnisch, 1923, *Zool. Jahrb. Syst.* **47** : 304 ; Kieffer, 1925, *Bull. Soc. R. ent. Égypte* **1924** : 279.

Gillotia Kieffer, 1921 *Ann. Soc. sci. Brux.* **40** (1) : 272 ; Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 31 (SYN. NOV.).

Harnischia Kieffer, 1921, *Bull. Soc. Hist. nat. Moselle* **29** : 69 ; Townes, 1945, *Amer. Midl. Nat.* **34** : 147 (both subgg. *Harnischia* and *Cladopelma*).

Chironomus Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 149 (in part).

Psectrocladius (!) Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 260 (not Kieffer, 1906, *Mém. Soc. sci. Brux.* **30** : 356).

Chironomus subg. *Chironomus* Groups D and E, Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 387.

Chironomus subg. *Cryptochironomus* Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 198 ; Goetghebuer, 1936, *ibid.* **28** : 469.

Chironomus subg. *Harnischia* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 470.

Tendipes subg. *Cryptochironomus* Goetghebuer, 1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*) : 34.

Frontal tubercles present or absent, palpi fully developed; prothorax reaching up to front of mesonotum, usually more or less divided by a suture as in *Dicrotendipes*, sometimes collar-like but more often thinner and closely applied to mesothorax, occasionally with a slight central indentation but without a strong V-shaped emargination. Colour variable, thorax sometimes pruinose or with grey dusting, wings often with cross-vein darkened. Last tarsal segment on all legs flattened dorsoventrally; combs of middle and posterior tibiae variable: in most species separate, well formed and each with a distinct spur; in some species they are fused and in others indistinctly separated, occasionally only one spur is present and in *C. aculeatus* the combs are fused and both spurs are absent. Male hypopygium with appendage 2 greatly reduced or almost absent, appendage 1 variable, often well formed; anal point variable.

My definition and use of *Cryptochironomus* includes all species of the genus *Chironomus* in which appendage 2 of the male hypopygium is greatly reduced or rudimentary. Additional characters such as the flattening of the fifth tarsal segment and the appearance of the pronotum are usually sufficient to place the females in the subgenus. Goetghebuer (1937) employed the subgenus in a very similar way.

There have been a number of attempts at splitting this large and often unwieldy group into further genera or subgenera, but in my opinion these attempts are unsatisfactory and often impractical because the definitions are mainly based on male genital characters. Several of the larger species show a tendency for the thorax to approach the condition seen in *Chironomus* sensu stricto and the tarsal character is not sufficient for generic status. I therefore see no alternative but to regard the group as a single subgenus of *Chironomus*.

Nilomyia was described by Kieffer to include a species from Sudan lacking spurs on the tibial combs. In all other characters of genitalia, thorax, tarsi, etc., it agrees with *Cryptochironomus* and I am regarding it as an aberrant species of this subgenus.

Kribiocryptus included two species, which according to Kieffer had only one spur on the posterior tibial comb. The colour and genital structure of *K. viridiventris* show that it is an earlier description of *Cryptochironomus niligenus* Kieffer; Kieffer either had a damaged specimen or else did not notice the two short spurs. The other species, *K. flaviventris* (= *unicalcar* nom. nov.), was fixed by Townes (1945) as type of the genus and has only a single tibial spur. As in *Nilomyia* it agrees closely with *Cryptochironomus* and I am again regarding it as an aberrant species of this genus.

Cladopelma was first described by Kieffer without included species in a key to the genera of the tribe " Chironomariae ". The first species to be mentioned were Palaearctic ones in his paper in the same year in *Bull. Soc. Hist. nat. Moselle.* Harnisch (1923) chose *C. virescens* Meigen as type of the genus which invalidates Townes later (1945) fixation of *C. laminata*. Kieffer only described the female of the type species and it is not possible to be absolutely certain that it belongs to the subgenus *Cryptochironomus* as recognized here but it seems highly probable that it does. Most of the African species placed by Kieffer in *Cladopelma* fit well into *Cryptochironomus*. His original key separates *Cladopelma* because the pulvilli are branched instead of being reticulate, although in his key to the African genera (1921) he does not mention the reticulation but simply states " pulvilli not branched ". I have made stained preparations of various species and can see no differences between the pulvilli of any of them. Edwards (1929) separated his group D (*Cladopelma*) from group E (*Cryptochironomus*) mainly because in the former, appendage 2 is broad and distinguishable in the dry specimen. In my opinion so much variety is shown in the size of appendage 2 that this distinction cannot be used. Townes (1945) treated *Cladopelma* as a subgenus of *Harnischia*.

Gillotia was erected for a species from the Sudan with easily recognizable male hypopygium but with antennae formed as in the female. I have two specimens with normal male antennae which shows that Kieffer's specimen was an intersex of a species of *Cryptochironomus*.

Psectrocladius was used by Kieffer for a female from Rhodesia. His description mentions the dorsal narrow portion of the eyes and examination of the type shows it to be a species of *Cryptochironomus*.

Kieffer erected *Harnischia* for a species with trilobed IXth tergite in the male.

Goetghebuer (1937) indicated that Kieffer himself had established that this was an earlier description of a species without trilobed tergite that had been described by Goetghebuer. Goetghebuer has used the name for a group of species of his subgenus *Cryptochironomus* in which both coxite appendages are short or absent. Townes (1945) raised it to generic status again, placing *Cladopelma* as a subgenus. I am following Goetghebuer and treating it as a synonym of *Cryptochironomus*.

Edwards and Goetghebuer recognized species groups in the Palaearctic species, basing their groupings on leg colour, presence of frontal tubercles and structure of male hypopygium. Most of these represented groups previously considered by Kieffer and Harnisch to be of generic status. I find that in the African species it is much more difficult to recognize well-defined species groups, although the male genitalia do offer some characters enabling what appear to be allied species to be placed next to each other; the species allied to *lindneri* and to *forcipatus* are examples. In general there is too much intergrading for satisfactory groupings to be offered.

As in the Palaearctic species there is similarity in external structure and appearance between many of the species and the only reliable and distinctive characters lie in the male genitalia. Except in the minority of distinctive species, females are almost impossible to identify in the absence of males. In addition, colour characters are unreliable and several of the green species may have the thoracic markings reddish-yellow, brown or black, different colour forms appearing in different localities, or there may be variation in the same locality.

Kieffer has described 33 African species and one variety in various genera that belong or seem to belong to *Cryptochironomus*. Of these I have been able to recognize all but 12, all of which were described from the female alone. I am giving an annotated list of these 12 species at the end of my treatment of the species of the subgenus. Goetghebuer has described three species, the types of which I have been able to study. I have myself described ten species some of which I now know to be varieties of species described by Kieffer. Altogether I am recognizing 29 species in the material at my disposal, eight being described as new.

KEY TO AFRICAN SPECIES OF *Chironomus* SUBG. *Cryptochironomus*

1. Thorax and abdomen black, at least mesonotal stripes shining 2
   If dark in colour then mesonotum grey with pruinosity or dusting . . . 4
2. Wing length 2·5 mm., brilliantly shining, abdomen with velvety bands at apices of abdominal segments 2 and 3, four posterior tibiae black, tarsi yellow *nigrocorporis* nom. nov.
   Not brilliantly shining, abdomen lacking velvety bands, posterior tibiae mainly pale 3
3. Wing length 2·5 mm., combs with well-formed spurs . . . *rhodesianus* Kieffer
   Wing length 1·5 mm., spurs reduced and hardly projecting beyond combs *pullatus* sp. n.
4. Yellowish species, abdomen and thorax both with black markings . . . 5
   Usually green or brown, if yellow then black markings not present on both abdomen and thorax 6
5. Lateral thoracic stripes and sometimes central one as well, black; second abdominal segment with broad black band, succeeding segments usually with some trace of narrow bands . . . . *niligenus* Kieffer

Mesonotum with four large black spots each side, the anterior two of each side joined and half surrounding a silvery spot on the shoulder; abdomen with black bands on segments 2–8 . . . *coronatus* Kieffer
6. Mesonotum with a central cone terminating in two small tubercles, eyes separated by less than their terminal width . . . *camelus* Kieffer
Mesonotum not like this, eyes wider apart . . . 7
7. Posterior tibiae with only one spur or else spurs completely absent . . . 8
Combs with normal two spurs . . . 10
8. Combs lacking spurs, male hypopygium as in Text-fig. 11, *k* . . . *aculeatus* Kieffer
Posterior tibiae with a single spur . . . 9
9. Thorax dark brown and pruinose, hypopygium as in Text-fig. 12, *i* . . . *brincki* nom. nov.
Thorax yellowish-brown, stripes dark brown, hypopygium as in Text-fig. 13, *b* *unicalcar* nom. nov.
10. Thorax covered with grey pruinosity or dusting, stripes usually but not always visible through the dusting . . . 11
Thorax green, stripes easily visible, not covered with grey dusting . . . 18
11. Male styles shorter and thicker, not more than three times as long as wide (Text-figs. 11, *c–f*) . . . 12
Male styles more elongate . . . 15
12. Appendage 1 rounded and well formed, greener species . . . 13
Appendage 1 elongate or nearly absent . . . 14
13. Style shorter (Text-fig. 11, *c*) anterior tarsus of male bearded . . . *lindneri* Freeman
Style longer (Text-fig. 11, *d*) tarsus not bearded . . . *neonilicola* nom. nov.
14. Style more elongate (Text-fig. 11, *e*) . . . *diceras* Kieffer
Style oval (Text-fig. 11, *f*) . . . *subovatus* Freeman
15. Style more or less straight . . . 16
Style definitely bent or curved . . . 17
16. IXth tergite produced at lateral margins (Text-fig. 11, *g*) . . . *trifidus* nom. nov.
IXth tergite not so produced (Text-fig. 11, *h*) . . . *cinereithorax* Goetghebuer
17. Style curved, appendage 1 long and curved (Text-fig. 11, *j*) . . . *sinuatus* sp. n.
Style bent, appendage 1 rudimentary (Text-fig. 13, *e*) . . . *inflexus* sp. n.
18. Male styles short and thick . . . cf. *lindneri* and *nilicola*
Male styles longer . . . 19
19. Styles more or less swollen in basal half (Text-figs. 12, *a–e*) . . . 20
Styles not at all swollen in basal half . . . 24
20. Styles strongly swollen or produced near the middle, anal point with setose swelling just before the middle (Text-fig. 12, *b*) . . . *stilifer* Freeman
Styles not as swollen as this . . . 21
21. Anal point shorter and thicker (Text-figs. 12, *c*, *e*) . . . 22
Anal point longer and thinner (Text-figs. 12, *a*, *d*) . . . 23
22. Style straighter, inner margins of coxites produced ventrally (Text-fig. 12, *e*) *acutus* Goetghebuer
Style curved, coxites not produced (Text-fig. 12, *c*) . . . *deribae* sp. n.
23. Coxite appendages longer, style thicker (Text-fig. 12, *a*) . . . *forcipatus* Freeman
Coxite appendages shorter, style thinner (Text-fig. 12, *d*) . . . *dewulfianus* Goetghebuer
24. Style long, swollen at apex, appendage 1 long and bent (Text-fig. 11, *l*) . . . *lewisi* sp. n.
Hypopygium not like this . . . 25
25. Anal point broad . . . 26
Anal point narrow . . . 27
26. Appendage 1 curved, styles merging imperceptibly into coxites (Text-fig. 12, *h*) *reidi* sp n.
Appendage 1 straight, styles and coxites with a definite point of separation (Text-fig. 12, *g*) . . . *melutensis* sp. n.

27. At least one definite coxite appendage present 28
    Coxite appendages not developed 29
28. Styles evenly curved, separated from coxites (Text-fig. 13, *a*) . . . *hirsti* sp. n.
    Styles bent near the apex, not separated from coxites (Text-fig. 13, *d*) *graminicolor* Kieffer
29. Styles straight (Text-fig. 13, *g*) . . . . *nudiforceps* Kieffer
    Styles bent (Tex-fig. 13, *f*) . . . . *lacteiforceps* Kieffer

Chironomus (Cryptochironomus) niligenus Kieffer

Kribiocryptus viridiventris Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 44 (not Kieffer, 1911, *Rec. Ind. Mus.* **6** : 162).
Chironomus niligenus Kieffer, 1923, *ibid.* **92** : 149.
Cryptochironomus fuscitarsis Kieffer, 1923, *ibid.* **92** : 154 (SYN. NOV.).
Cryptochironomus longiventris Kieffer, 1923, *ibid.* **92** : 157 (SYN. NOV.).
? *Cryptochironomus aculeatus* Kieffer, 1923, *ibid.* **92** : 157 (not Kieffer, 1921, *ibid.* **90** : 38).

A large yellow species with reddish central and dark lateral thoracic stripes, central stripe sometimes dark especially in the female; anterior legs largely dark; abdomen yellow with variable dark bands, but segment 2 almost invariably carrying a broad band; thoracic pleura with strong silvery shimmer; anterior tarsi of male slightly bearded; male hypopygium with greatly reduced coxite lobes, styles pointed.

The size and colour, especially the broad dark band on segment 2 of the abdomen make this species easily recognized in both sexes. The tibial spurs are short and Kieffer seems to have overlooked one when he placed this species in *Kribiocryptus*; the colour and structure show that it is the same species as he later described in *Cryptochironomus* as *fuscitarsis*, but the use of subgenera causes *viridiventris* to be a homonym. *C. niligenus*, *fuscitarsis*, *aculeatus* and *longiventris* were all captured at the same place and on the same date but *aculeatus* differs, according to the description, by the prolongation of the last tergite in the female as a brown sharp point; in other respects it agrees with the others and until a specimen showing this character can be found, I am assuming Kieffer's specimen to be aberrant.

Male. Wing length 2·5–3·0 mm., body length up to 6 mm.

Head yellow or brown, palpi well developed, frontal tubercles present but very small, antennae yellowish-brown, A.R. about 3·5. *Thorax* yellow and shining, central stripe, sternopleuron and apex of scutellum reddish or occasionally brown, lateral stripes blackish-brown, pleura with conspicuous silvery shimmer; pronotum collar-like but without central V-shaped emargination. *Legs* yellow; anterior tibiae usually but not invariably dark brown, anterior tarsi blackish, base of basitarsus often pale, segments 2–5 of posterior four tarsi darkened; L.R. about 1·3, anterior tarsus with slight beard; combs fused, tibial spurs two in number and rather short. *Wings* with cross-vein slightly darkened, halteres with blackish knobs. *Abdomen* yellow; segment 2 largely occupied by a broad black band which is emarginate posteriorly, segment 4 with a narrow band basally; other segments with indications of basal darkening but seldom with definite bands. Hypopygium (Text-fig. 11, *a*) darkened, styles pointed, coxite appendages very reduced, anal point long.

Female very similar to male in pattern, often rather darker and central thoracic stripe more frequently black. Last antennal segment nearly three times as long as fifth, segments 3–5 with short stout necks.

Type material of all five species probably lost; type locality of *viridiventris* FRENCH CAMEROONS: Kribi, of all the other four SUDAN: Shambe.

DISTRIBUTION. SUDAN: 6 ♂, 2 ♀, Yirol, iii.1954 and vi–vii.1954 (*E. T. M. Reid*); 1 ♂, 1 ♀, nr. Wau, iii–iv.1955 (*E. T. M. Reid*). UGANDA: Many specimens taken at light, Bukakata (*P. S. Corbet*). KENYA: 1 ♀, in aeroplane, Kisumu, xi.1936 (*C. B. Symes*). NIGERIA: 1 ♂, Onitsha, x.1932 (*Anderson*). To these must be added the type locality of *viridiventris*.

Chironomus (Cryptochironomus nigrocorporis nom. nov.

Cryptochironomus leucopus Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 156 (not *Chironomus leucopus* Meigen, 1830, *Syst. Beschr* **6** : 249).

A large shining black species, halteres yellow, anterior femur and posterior four tarsi yellow, apical quarters of second and third abdominal segments velvety black; easily distinguished in both sexes from other species by its colour and size. The downgrading of *Cryptochironomus* causes *leucopus* to become a homonym.

Male. Wing length 2·5 mm., body length 5 mm.

Head black, palpi brown, antennae brown, A.R. about 3·5, small frontal tubercles present. *Thorax* shining black all over, stripes indistinguishable, pleura with some pruinosity; prothorax collar-like and with a shallow central emargination. *Legs* largely black; trochanters, anterior femur, anterior basitarsus and segments 1–3 of posterior four tarsi yellow or yellow with obscure darkening at the tips; anterior tarsus slightly bearded, L.R. about 1·3, combs fused, two short spurs present. *Wings* with cross-vein and basal veins brownish, halteres yellow. *Abdomen* shining black, apical quarters of segments 2 and 3 velvety black. Hypopygium (Text-fig. 11, *b*) black, styles short, a single lobular coxite appendage present, anal point wider than in *viridiventris*.

Female similar to male in colour and pattern except that the velvety areas on the abdomen may be more extensive; antennal segments 3–5 fusiform, 6 as long as 4 and 5 together.

Type series probably lost, locality SUDAN: Shambe.

DISTRIBUTION. SUDAN: 17 ♂, 4 ♀, Melut, xi.1953 (*E. T. M. Reid*). UGANDA: 2 ♀, L. Albert, iii.1954 (*P. S. Corbet*). BELGIAN CONGO: 2 ♂, Kasenyi (L. Albert) ii.1953 (*J. Verbeke*); 1 ♂, Sabe, xii.1953 (*J. Verbeke*); 6 ♀, Maka Lualaba, i.1939 (*H. J. Brédo*); 1 ♀, Elisabethville, ii.1939 (*H. J. Brédo*). FRENCH WEST AFRICA: 1 ♀, Haute Volta, Bobo Dioulasso, ix.1956 (*J. Hamon*).

Chironomus (Cryptochironomus) lindneri Freeman

Cladopelma (?) *pseudolabis* Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 53 (not Kieffer, 1915, *Zool. Jahrb.* **39** : 111).

Chironomus (*Cryptochironomus*) *lindneri* Freeman, 1954, *Archiv. Hydrobiol.* **48** : 443.

Cryptochironomus lindneri Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 16; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 374.

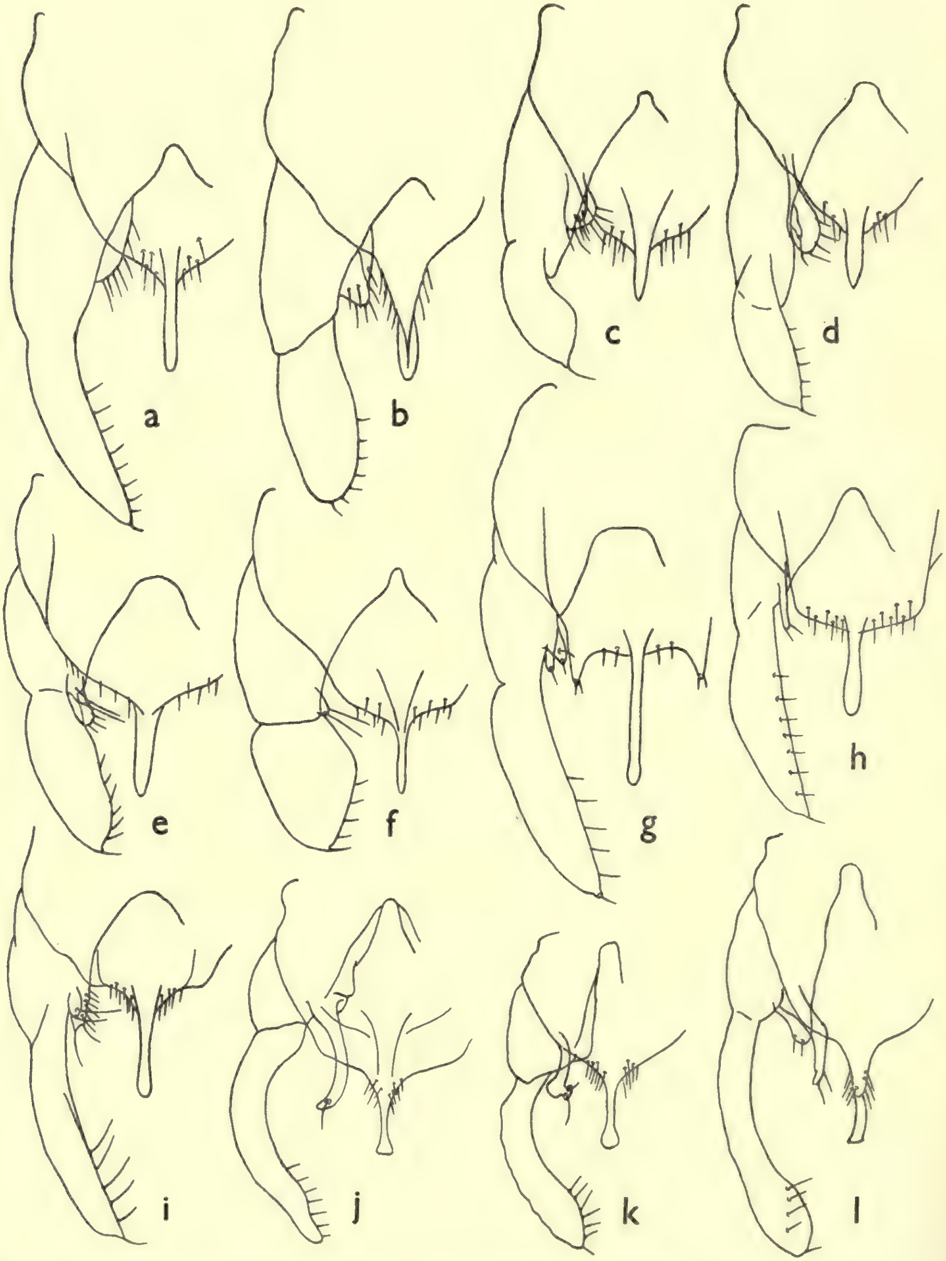

FIG. 11. Male hypopygia of *Chironomus* subg. *Cryptochironomus*. (*a*) *C. niligenus ;* (*b*) *C. nigrocorporis ;* (*c*) *C. lindneri ;* (*d*) *C. neonilicola ;* (*e*) *C. diceras ;* (*f*) *C. subovatus ;* (*g*) *C. trifidus ;* (*h*) *C. cinereithorax ;* (*i*) *C. camelus ;* (*j*) *C. sinuatus ;* (*k*) *C. aculeatus ;* (*l*) *C. lewisi.*

Fairly large greenish species, thorax with grey pruinosity, stripes reddish, anterior legs usually darkened and tarsus usually slightly bearded in the male. Hypopygium with short styles, appendage 1 rounded.

The name *pseudolabis* was used by Kieffer for a species of *Chironomus* from Faröe Is., also now placed in the subgenus *Cryptochironomus*, and it was therefore necessary for a new name to be found for the later described African species. It is not difficult to separate, except from the next species, because there are few green species with the thorax grey dusted or pruinose; it is to be distinguished from *nilicola* by the shape of the male styles and by the slightly larger size.

Male. Wing length 2·5–3·0 mm., body length 4–6 mm.

Head greenish or brownish, palpi often rather short, frontal tubercles distinct, A.R. 4 or more. *Thorax* with green background; stripes, apex of postnotum and sternopleuron reddish or brown; whole thorax covered by light grey pruinosity through which the markings are clearly seen; prothorax collar-like and with a shallow central emargination. *Legs* green, anterior tibia, apex of femur and tarsus blackish in dark specimens but only brown in lighter ones; posterior four tarsi darkened at the tips; L.R. about 1·5, anterior tarsus usually with sparse beard, combs of posterior tibiae separate and each with a well-formed spur. *Wings* either plain or with very slightly darkened cross-vein, halteres green. *Abdomen* green; hypopygium (Text-fig. 11, *c*) with characteristic short styles, both appendages present, rounded and pubescent, IXth tergite broad.

Female very similar to male in colour and pattern; antennae with segments 3 and 4 with short necks, 5 with a longer neck, 6 equal to 4 and 5 together.

Holotype male probably lost, locality SUDAN: Shambe.

DISTRIBUTION. The following records are additional to my previously published records from BELGIAN CONGO (Parc Nat. Albert), CAPE PROVINCE, ORANGE FREE STATE. SUDAN: 2 ♀, Yirol, vi–vii.1954 (*E. T. M. Reid*). UGANDA: Series taken at light, L. Victoria (*W. W. Macdonald* and *P. S. Corbet*); 2 ♂, Mugango, iii.1952 (*E. Lindner*). BELGIAN CONGO: 12 ♂, 2 ♀, Elisabethville, xi.38–iii.39 (*H. J. Brédo*). N. RHODESIA: 1 ♂, L. Bangweulu, vi.1956 (*G. Fryer*). TRANSVAAL: 1 ♂, Assegai R., Piet Retief, ix.1954 (*A. D. Harrison*). CAPE PROVENCE: 1 ♂, Ceres, iii.1925 (*R. E. Turner*); 1 ♂, Wellington, xi.1955 (*K. M. F. Scott*).

Chironomus (Cryptochironomus) neonilicola nom. nov.

Cryptochironomus nilicola Kieffer, 1923, *Ann. Soc. ent. France*, **92**: 161 (not *Calochironomus nilicola* Kieffer, 1922, *ibid.* **91**: 70).

Colour and general structure similar to *lindneri*; separated by smaller size (wing length 2 mm.) and by the more elongate male styles (Text-fig. 11, *d*); in addition, the male tarsus appears not to be bearded. It is possibly only a small variety of *lindneri*. The use of *Cryptochironomus* as a subgenus and *Calochironomus* as a synonym of *Dicrotendipes* causes *nilicola* to be a homonym.

Type series probably lost, locality SUDAN: Shambe.

DISTRIBUTION. SUDAN: 12 ♂, 8 ♀, Khartoum, iv.1951 (*D. J. Lewis*); 8 ♂, Shambe, xi.1953 and 1 ♂, nr. Wau, ii–iv.1955 (*E. T. M. Reid*).

Chironomus (Cryptochironomus) diceras Kieffer

Cladopelma fimbriatum Kieffer,* 1922, *Ann. Soc. ent. France,* **91** : 55 (not Kieffer, 1910, *Mem. Ind. Mus.* **2** : 238).

Cryptochironomus diceras Kieffer, 1923, *Ann. Soc. ent. France,* **92** : 163; Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 18.

Thorax grey pruinose with dark brown stripes, abdomen dark brown or blackish; hypopygial structure resembles that of previous two species in general appearance but upper coxite appendage is narrow and curved, lower with two long bristles. Kieffer's two species were caught on the same day at the same place, have similar genital structure and are almost certainly synonymous but the use of subgenera causes the earlier to be a homonym.

Male. Wing length 1·75–2·0 mm.

Head dark grey pruinose, palpi brown, frontal tubercles well developed; antennae brown, A.R. about 2·5. *Thorax* grey pruinose; stripes, postnotum and sternopleuron dark brown, visible through the pruinosity; prothorax not collar-like, adpressed to front of the thorax. *Legs* yellowish-brown, anterior knees and apices of tibiae brown, L.R. nearly 2, anterior tarsus not bearded, combs separate, spurs well formed, one to each comb. *Wings* unmarked, halteres yellow. *Abdomen* dark brown or blackish. Hypopygium (Text-fig. 11, *e*) with stout anal point; both coxite appendages present, 1 curved and parallel-sided, 2 smaller and with two long bristles, styles more elongate than in *lindneri*.

Female resembles male in colour, segments 3–5 of antennae with distinct necks and long bristles, segment 6 one and a half times as long as 5.

Type specimens of both species probably lost, locality of both SUDAN: Shambe.

DISTRIBUTION. SUDAN: 11 ♂, 3 ♀, Khartoum, iv.1952 (*D. J. Lewis*); 1 ♂, nr. Wau, iii–iv.1955 (*E. T. M. Reid*). NIGERIA: 1 ♂, 6 ♀, Onitsha, x.1932 (*D. Anderson*). FRENCH WEST AFRICA: 1 ♂, Haute Volta, Bobo Dioulasso, ix.1956 *J. Hamon*). BELGIAN CONGO: 22 ♂, 3 ♀, Parc Nat. Albert (*H. Damas*). TRANSVAAL: 2 ♂, Marble Hall, v.1955 (*A. D. Harrison*).

Chironomus (Cryptochironomus) subovatus Freeman

Chironomus (*Cryptochironomus*) *subovatus* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 20.

Cryptochironomus subovatus Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 375.

In general appearance, colour and size similar to *diceras*; legs of type series rather pale, in other specimens coloured as in *diceras*; frontal tubercles either absent or very small. Readily separated from *diceras* and other dark species by the male hypopygium (Text-fig. 11, *f*) in which styles are short and broad, anal point narrow and only one coxite appendage present carrying two bristles.

Holotype male in British Museum, type locality CAPE PROVINCE: Berg R., Piquetberg.

DISTRIBUTION. CAPE PROVINCE: Holotype and other specimens, Piquetberg; paratypes, Ceres; 1 ♂, Upington (*Brinck*). SUDAN: 4 ♂, Khartoum, ii.1923 (*S. Hirst*) and 1 ♂, iv.1952 (*D. J. Lewis*); 5 ♂, 2 ♀, Liednum nr. Wau, iii.iv.1955 (*E. T. M. Reid*). FRENCH WEST AFRICA: 1 ♂, Bobo Dioulasso, ix.1956 (*J. Hamon*).

Chironomus (Cryptochironomus) trifidus nom. nov.

Gillotia fuscipes Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 62 (not *Chironomus fuscipes* Kieffer, 1909, *Munster Jahr. Prov. Wiss.* **37** : 31).

A dark species very similar to *diceras* and *subovatus*, A.R. rather higher and L.R. lower, readily distinguished in the male by the shape of the IXth tergite. With the synonymizing of *Gillotia, fuscipes* becomes a homonym.

The male hypopygium is so distinctive that there can be no doubt over its identity. Kieffer's description was based on a specimen with female type antennae and male hypopygium and was almost certainly an intersex caused by a parasitic worm (see Pt. I, p. 18). My specimens are normal and carry plumed antennae.

Male. Wing length 2·0–2·75 mm.

Head brown, frontal tubercles indistinguishable, antennae brown, A.R. about 4. *Thorax* grey with pruinosity; stripes, postnotum and sternopleuron dark brown or blackish; prothorax applied to front of thorax. *Legs* brown, front ones dark brown, L.R. 1·3, combs separate, each with a well-formed spur. *Wings* unmarked, halteres more or less pale. *Abdomen* blackish; hypopygium (Text-fig. 11, *g*) with anal point long and slender and lateral margins produced so that IXth tergite appears trilobed; two small coxite appendages present, style long and with straight inner margin.

Female not known to me. According to Kieffer segments 3–5 of antennae are fusiform and segment 6 is twice as long as 5.

Holotype is probably lost, locality SUDAN: Shambe.

DISTRIBUTION. SUDAN: 1 ♂, Khartoum, x.1951 (*D. J. Lewis*); 1 ♂, Melut, xi.1953 (*E. T. M. Reid*).

Chironomus (Cryptochironomus) cinereithorax Goetghebuer

Chironomus (*Cryptochironomus*) *cinereithorax* Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 199.
Cryptochironomus brunnescens Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 373 (SYN. NOV.).

Resembles *trifidus* but perhaps darker, A.R. and L.R. nearer to those of *diceras*, frontal tubercles distinguishable, anal point thicker than in *fuscipes*, IXth tergite not trilobed, only one coxite appendage present.

Examination of Goetghebuer's type shows that his figure of the male hypopygium is inaccurate and that the little lobes he has drawn at the base of the anal point and at the lateral angles of the IXth tergite do not exist. My species must therefore fall as a synonym.

Male. Wing length 2–2·5 mm.

Head, mouthparts and pedicel blackish-brown, small frontal tubercles distinguishable, A.R. about 2·5. *Thorax* with dark grey pruinosity, through which darker stripes can just be distinguished (the greenish colour mentioned in the description of *brunnescens* was due to the surface pruinosity being damaged by body fluids; spirit specimens do appear paler). *Legs* brown, anterior tibiae and apices of femora darker, L.R. 1·8, tarsus not bearded, combs separate and each with a spur. *Wings* unmarked, halteres pale. *Abdomen* dark brown; hypopygium (Text-fig. 11, *h*) with broad IXth tergite which is not produced at the lateral angles, anal point thicker and shorter than in *trifidus*, style straight, coxite with a single appendage.

Female not known.

Holotype male of *cinereithorax* in Musée Royal du Congo Belge; of *brunnescens* in British Museum.

DISTRIBUTION. CAPE PROVINCE: Holotype of *brunnescens*, Kimberley; paratype, Mt. Fletcher. BELGIAN CONGO: Holotype of *cinereithorax*, Kivu; 2 ♂, Maka Lualaba, i.1939 (*H. J. Brédo*).

Chironomus (Cryptochironomus) camelus Kieffer

Cryptochironomus niloticus Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 162 (not *Chironomus niloticus* Kieffer, 1923, *ibid.* **92** : 150).

Cryptochironomus camelus Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 286 ; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 18.

A very distinctive species easily distinguished in both sexes by the cone-shaped protuberance in the middle of the mesonotum ending in two small tubercles. Another unusual feature is the size and closeness of the eyes and the banding of the anterior femur especially in the female. Although Kieffer seems not to have noticed the peculiar thorax when he described *niloticus*, it is obviously an earlier description of *camelus* because of the closeness of the eyes and the banded femur but the name cannot be used because it is now a homonym.

Male. Wing length 2–2·5 mm.

Head brown, mouthparts whitish, eyes with the dorsal narrow portions longer than usual and only separated by less than their terminal width; frontal tubercles absent; antennal plumes white with the hairs brown at their bases, A.R. about 2·5. *Thorax* with grey pruinosity overlying a greenish background and reddish-brown stripes, postnotum and sternopleuron; mesonotum produced centrally into a cone which ends in a small tubercle on each side of the acrostichal bristles which are better developed than usual at this point; prothorax closely applied to thorax. *Legs* whitish; anterior knees, apices of tibiae and apices of all tarsal segments dark; L.R. 2, anterior tarsus with slight beard, combs separate and each with a spur. *Wings* plain, halteres whitish. *Abdomen* dark green, segments 2–5 each with a large black marking occupying their apical three-quarters; segments 1 and 6 may have traces of similar markings. Hypopygium (Text-fig. 11, *i*) with well-developed anal point, styles fairly straight, more blunt-ended in side view, two small coxite appendages present.

Female differs from male in the much darker abdomen and the better developed dark markings on the anterior legs; anterior femur broadly darkened apically and basally, anterior tibia may have apex and basal half brown; antennae with segments 3–5 fusiform, segment 6 one and a half times as long as 5.

Types of both species probably lost; type locality of *niloticus* SUDAN: Shambe, of *camelus* EGYPT: Maadi.

DISTRIBUTION. SUDAN: Series of both sexes taken at light, Khartoum (*D. J. Lewis*), also at Adok, Melut and Shambe (*E. T. M. Reid*). BELGIAN CONGO: 4 ♂, 2 ♀, Ishango, Parc Nat. Albert (*Damas*).

Chironomus (Cryptochironomus) sinuatus sp. n.

In appearance not unlike *fimbriatus* and other dark species but all knees broadly darkened and the elongate and curved male styles and coxite appendage make it readily distinguishable.

Male. Wing length 2 mm.

Head and mouthparts brown, small frontal tubercles present, antennae brown, A.R. about 2·5. *Thorax* greenish, covered with grey pruinosity or dusting; stripes, postnotum and sternopleuron dark brown, prothorax more or less collar-like. *Legs* yellowish-brown, all knees broadly darkened including basal half of anterior tibia, all femora darker in basal half, tibiae dark at apices, front tarsi missing, other tarsi darker towards apices; combs fused, each with a spur. *Wings* plain, halteres pale. *Abdomen* very dark brown. Hypopygium (Text-fig. 11, *j*) with elongate curved styles, only one coxite appendage well formed, elongate and curving outwards, anal point broader at apex.

Female not known.

Holotype male SUDAN: Khartoum, x.1951 (*D. J. Lewis*); paratypes, 2 ♂, SUDAN: Liednum, nr. Wau, iii–iv.1955 (*E. T. M. Reid*); all specimens in British Museum.

Chironomus (Cryptochironomus) aculeatus Kieffer

Nilomyia aculeatus Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 38.

A grey species with darker thoracic markings, easily distinguished from all other African species of the subgenus known to me by the absence of spurs on the tibial combs. When Kieffer described this species he placed it in a separate genus because of the absence of tibial spurs, but all the other characters are so similar to those of *Cryptochironomus* that I have no hesitation in considering it simply to be an aberrant species of that subgenus, allied to *sinuatus*.

Male. Wing length 1·5–2·0 mm.

Head brown, small frontal tubercles present; scape blackish, plumes grey, A.R. about 2. *Thorax* covered with grey dusting, through which the darker stripes can be distinguished. *Legs* brown, last tarsal segment of all legs flattened, pulvilli well developed, L.R. about 1·3, tarsal beard absent, combs of four posterior tibiae fused and spurs completely absent. *Wings* whitish, halteres white, squama fringed. *Abdomen* olive-green or brownish; hypopygium (Text-fig. 11, *k*) with curved styles, anal point broadened at apex and down-curved; appendage 1 curved, swollen at apex and with an inner apical lobe bearing a long and a short seta, appendage 2 just distinguishable.

Female resembles male in colour; antennae with segments 3–5 oval, 6 equal to 4 and 5 together or slightly longer.

Type female probably lost, locality SUDAN: South of Khartoum.

DISTRIBUTION. EGYPT: 10 ♂, 2 ♀, Assuan, i.1923 (*S. Hirst*); 1 ♂, Moascar, iii.1942 (*J. W. S. Macfie*). SUDAN: 32 ♂, 18 ♀, Nile above Alaki, i.1923 (*S. Hirst*); 20 ♂, 14 ♀, Meroe (*S. Hirst*); 10 ♂, Wadi Halfa (*S. Hirst*); 13 ♂, 8 ♀, Wadi Halfa (*D. J. Lewis*).

Chironomus (Cryptochironomus) lewisi sp. n.

Green with reddish-yellow thoracic markings; shows some resemblance to *sinuatus* in structure of male hypopygium but easily separated by clubbed style.

Male. Wing length 1·75 mm.

Head greenish, frontal tubercles absent, scape reddish-brown, flagellum broken. *Thorax* green; stripes, postnotum and sternopleuron reddish-yellow. *Legs* green, anterior tarsi broken, combs of middle and posterior tibiae fused, each with a spur. *Wings* plain, squama fringed, halteres green. *Abdomen* green, hypopygium (Text-fig. 11, *l*) with slightly clubbed and rather long styles, appendage 1 well formed and bent, appendage 2 reduced to a lobe; anal point curved downwards and carried at the end of a cone-shaped projection of the IXth tergite.

Female not known.

Holotype male SUDAN: Khartoum, x.1951 (*D. J. Lewis*) in British Museum.

Chironomus (Cryptochironomus) forcipatus Freeman

Cryptochironomus aegyptius Kieffer, 1925, *Bull. Soc. R. ent. Égypte,* **1924** : 288 [not *Tendipes* (= *Chironomus*) *aegyptius* Kieffer, 1913, *Rec. Ind. Mus.* **9** : 139].

Chironomus (*Cryptochironomus*) *aegyptius* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 469.

Chironomus (*Cryptochironomus*) *forcipatus* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 20 ; Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 17.

A small green species with either reddish or black thoracic markings. My species was described from specimens with dark markings, but I now see no reason for keeping them separate from the paler forms described by Kieffer. It is most easily separated from other species by the shape of the male styles; it most closely resembles *stilifer* and *deribae* but the shape of anal point and styles are sufficient to distinguish them.

It is possible that the female was earlier described by Kieffer as *Psectrocladius* [*sic*] *rhodesiae* and *Cryptochironomus ocularis* but for the present I prefer not to regard these as the same species (see notes at end of genus), but to use *forcipatus* in place of *aegyptius* which is now a homonym.

Male. Wing length 1·5–2·0 mm.

Head greenish, frontal tubercles absent, pedicel reddish or black, A.R. about 2. *Thorax* green; stripes, postnotum and sternopleuron either reddish or brown or black. *Legs* mostly green; front legs black or brown, femora paler in basal half especially beneath, posterior four tarsi darkened at the apices; L.R. 1·5, tarsal beard absent, combs fused, two rather long spurs present on each of four posterior tibiae. *Wings* plain, squama fringed, halteres green or yellow. *Abdomen* green, in very dark specimens appearing almost blackish. Hypopygium (Text-fig. 12, *a*) with styles slightly swollen basally, not separated from coxite; a single elongate coxite appendage present; anal point long, IXth tergite hairy around base of point as usual but with a pair of small lobes beneath, each carrying a few hairs; these lobes may be drawn back as figured or they may project more as shown in the figure of *stilifer*.

Female resembles male in colour and pattern; eyes rather wide apart; antennal segments 3–5 oval, 6 as long as 3–5 together.

Type series of *aegyptius* probably lost, locality EGYPT: Maadi. Holotype male of *forcipatus* in British Museum, locality CAPE PROVINCE: Berg R., Piquetberg.

DISTRIBUTION. EGYPT: 1 ♂, Suez Canal, x.1934 (*F. W. Edwards*). UGANDA: Long series at light, Jinja (*W. W. Macdonald*). BELGIAN CONGO: 3 ♂, Parc Nat. Albert (*de Witte* and *Verbeke*). NATAL: 1 ♂, Sundays R., ix.1953 and 2 ♀, Mooi R., Keate's Drift (*A. D. Harrison*). CAPE PROVINCE: holotype and other specimens of *forcipatus*, Berg R. (*K. M. F. Scott*).

Chironomus (Cryptochironomus) stilifer Freeman

Chironomus (*Cryptochironomus*) *stilifer* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 176.

This is obviously closely related to *aegyptius* and may only be a variety of it; the two were taken in a mixed series at Jinja by W. W. Macdonald. The main differences lie in the male genitalia but the leg ratio is possibly nearer 2 and none of the specimens that I have seen have black markings. The male styles (Text-fig. 12, *b*) have the basal swollen part exaggerated and the coxite appendage is longer than in *aegyptius*. The IXth tergite is more truncated and the apical hairs are carried on a swelling nearly half-way along the anal point, the two lateral lobes are much more obvious than they are in *aegyptius*.

Holotype male in British Museum.

DISTRIBUTION. CAPE PROVINCE: Holotype and other specimens, Berg R. (*K. M. F. Scott*). UGANDA: Long series at light, Jinja (*W. W. Macdonald*). SUDAN: Long series at light, Khartoum, iv.1951 and ii.1952 (*D. J. Lewis*); 3 ♂, Yirol, iii and xii.1954 (*E. T. M. Reid*).

Chironomus (Cryptochironomus) deribae sp. n.

Similar to *aegyptius* but rather larger, best distinguished by the male hypopygium with its short anal point and coxite appendage.

Male. Wing length 2·5 mm.

Head and mouthparts green, palpi normal, frontal tubercles absent, pedicel black, A.R. about 2·5. *Thorax* green; stripes, postnotum and sternopleuron black. *Legs* greenish, anterior legs with indication of darkening as in *aegyptius* but type series rather immature and possibly not fully darkened; L.R. 1·3, tarsus not bearded, combs fused, with two spurs on each tibia. *Wings* with cross-vein darkened, halteres pale. *Abdomen* dark green, styles whitish; hypopygium (Text-fig. 12, *c*) resembling that of *aegyptius* but style shape more exaggerated, anal point shorter and hairy, lateral lobes absent, coxite appendage shorter.

Female similar to male in colour, antennae broken.

Holotype male and paratypes 2 ♂, 1 ♀, SUDAN: Deriba, 7,500 ft., i.1954 (*D. J. Lewis*) all in British Museum.

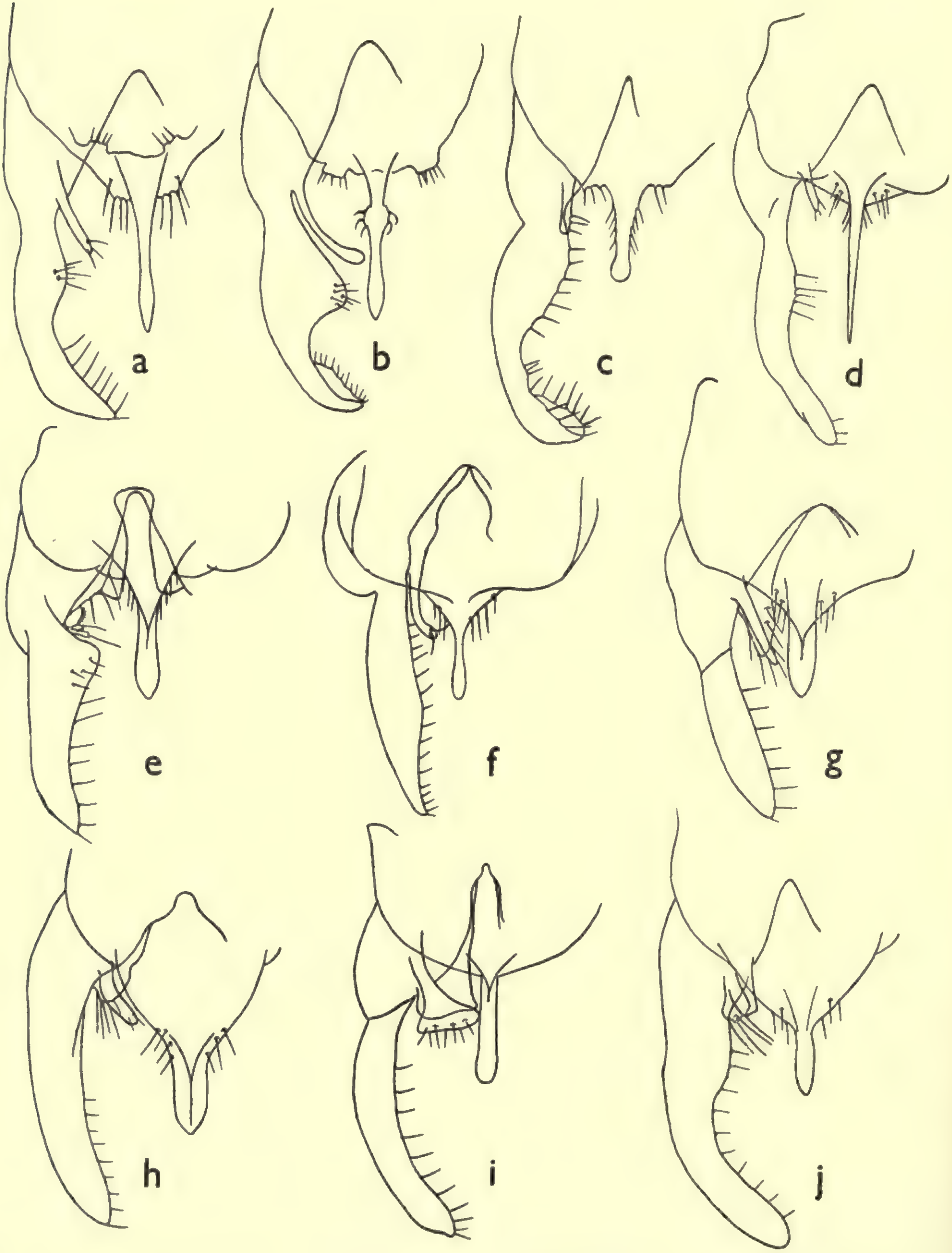

FIG. 12. Male hypopygia of *Chironomus* subg. *Cryptochironomus*. (*a*) *C. forcipatus* ; (*b*) *C. stilifer* ; (*c*) *C. deribae* ; (*d*) *C. dewulfianus* ; (*e*) *C. acutus* ; (*f*) *C. coronatus* ; (*g*) *C. melutensis* ; (*h*) *C. reidi* ; (*i*) *C. brincki* ; (*j*) *C. rhodesianus*.

Chironomus (Cryptochironomus) dewulfianus Goetghebuer

Chironomus (*Cryptochironomus*) *dewulfianus* Goetghebuer, 1934, *Rev. Zool. Bot. Afr.* **25** : 198.
Cryptochironomus dewulfianus Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 17.

A green species with brown or black thoracic markings, very similar to *aegyptius* from which it is most easily separated by the male hypopygium, the styles being longer and the anal point narrower.

Male. Wing length 1·5–2·0 mm.

Head green, mouthparts brown, frontal tubercles absent, pedicel brown, A.R. 2. *Thorax* green with some pruinosity; stripes, postnotum and sternopleuron brown or blackish. *Legs* greenish, anterior ones more brown, especially at the knees, apex of tibiae and on tarsi, but not definitely darkened; L.R. 1·75, tarsal beard absent, combs just separated, each with a spur. *Wings* unmarked, halteres pale. *Abdomen* green; hypopygium (Text-fig. 12, *d*) with narrow, bent styles which are slightly swollen basally; a single short coxite appendage present; IXth tergite broad at apex and not conical, anal point long and tapered.

Female not known.

I have seen the holotype male in Musée Royal du Congo Belge.

DISTRIBUTION. N. NIGERIA: 1 ♂, Kankiya, Katsina Prov., ix.1956 (*B. McMillan*). SUDAN: 1 ♂, Rumbek, vi–vii.1954 (*E. T. M. Reid*). UGANDA: 1 ♂, Namasagali, iv.1929 (*G. du Soleil*). BELGIAN CONGO: Holotype, Katana, Kivu; 1 ♂, Ishango (*Damas*); 5 ♂, Lakes Kivu, Edward and Albert (*J. Verbeke*). S. RHODESIA: 1 ♂, Salisbury, v.1956 (*E. T. M. Reid*).

Chironomus (Cryptochironomus) acutus Goetghebuer

Chironomus (*Harnischia*) *acutus* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 470.
Cryptochironomus acutus Freeman, 1955, *Explor. Parc Nat. Albert,* Miss. de Witte, fasc. **83** : 17.

Green with reddish-yellow or brown thoracic markings. Distinguished from similarly coloured species such as *aegyptius* by the structure of the male hypopygium, especially the shape of the styles and the very short coxite appendages.

Male. Wing length 2–2·5 mm.

Head and mouthparts green, very small frontal tubercles present, pedicel reddish, A.R. 2. *Thorax* green; stripes, postnotum and sternopleuron in pale specimens reddish-yellow, in darker specimens brown. *Legs* greenish, front ones slightly brown, L.R. 1·8, tarsal beard absent, combs separate, each with a spur. *Wings* plain, halteres green, squama fringed. *Abdomen* green; hypopygium (Text-fig. 12, *e*) with pointed styles which are swollen near the base; two small coxite appendages present, inner margin of coxite produced ventrally; anal point well developed, XIth tergite transverse.

Female similar to male in colour; antennal segments 3–5 oval, 6 twice as long as 5.

I have seen the holotype male in Musée Royal du Congo Belge, locality BELGIAN CONGO: Vitshumbi.

DISTRIBUTION. Besides already recorded material from BELGIAN CONGO: Parc

National Albert, I have seen the following: CAPE PROVINCE: 3 ♂, 8 ♀, Berg River, Wellington and Little Princess Vlei, iii–iv.1953 (*K. M. F. Scott*). TRANSVAAL: 1 ♂, 2 ♀, Marble Hall, v.1955 (*A. D. Harrison*). BELGIAN CONGO: 1 ♂, Musosa, x.1939 (*H. J. Brédo*). NIGERIA: 1 ♂, Kankiya, x.1956 (*B. McMillan*).

Chironomus (Cryptochironomus) coronatus Kieffer

Cladopelma coronatus Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 52.

General colour yellowish, thorax with a thick U-shaped black mark each side anteriorly, the centre of each mark pruinose, and with additional black marks on the lateral margins and at the wing bases; abdominal segments black banded. Male hypopygium with pointed styles and a single long coxite appendage. The pattern makes the species conspicuous in both sexes.

Male. Wing length 2–2·75 mm.

Head yellow, palpi fairly long and brownish, frontal tubercles absent, pedicel yellow, plume hairs darker apically, A.R. 2·5. *Thorax* yellow, stripes slightly darker, lateral mesonotal margins and pleura with silvery pruinosity. Mesonotum with four large black spots each side, the anterior two of each side joined to form a thick U, the centre being a round silvery spot on the shoulder; the other two spots are one in the middle of the lateral margin and one above the wing base; postnotum blackish, sternopleuron reddish-yellow. *Legs* yellow with all knees, apices of all tibiae and of all tarsal segments broadly black; L.R. 1·6, tarsal beard absent, combs separate, spurs short. *Wings* with veins often seamed with grey, halteres pale. *Abdomen* yellow, segments 2–8 with a central transverse dark band which is expanded centrally as an oval spot on segments 2–4. Hypopygium (Text-fig. 12, *f*) with styles swollen near the middle and then tapered; coxites broad, a single narrow appendage present, IXth tergite broad, anal point well developed.

Female similar to male in colour and pattern; antennae with segments 3–5 spindle-shaped, 6 equal to 4 and 5 together.

Holotype male probably lost, locality FRENCH CAMEROONS: Kribi.

DISTRIBUTION. SUDAN: 1 ♂, 1 ♀, Amadi, vi–vii.1954 (*E. T. M. Reid*). UGANDA: 8 ♀, Jinja, ix–x.1954 (*P. S. Corbet*). BELGIAN CONGO: 1 ♀, Elisabethville, iv.1939 (*H. J. Brédo*). NATAL: 1 ♂, Mooi R., Rosetta, ix.1953 (*A. D. Harrison*).

Chironomus (Cryptochironomus) melutensis sp. n.

A small green species with reddish thoracic markings, very similar to other green species such as *reidi* in appearance but with different male hypopygium, appendage 2 being much larger and IXth tergite not conical.

Male. Wing length 1·5–1·8 mm.

Head greenish, frontal tubercles absent, pedicel reddish-yellow, flagellum broken. *Thorax* pale green with some pruinosity; stripes, postnotum and sternopleuron reddish-yellow. *Legs* green, tarsi browner towards the apices, front tarsi missing, combs fused, two spurs present. *Wings* plain, halteres green. *Abdomen* green.

Hypopygium (Text-fig. 12, *g*) with straight styles and broad anal point, both coxite appendages present, the upper one narrower than the lower.

Female not known.

Holotype male SUDAN: Melut, xi.1953 (*E. T. M. Reid*) in British Museum.

Chironomus (Cryptochironomus) reidi sp. n.

Green with reddish-yellow or brownish stripes, L.R. 1·75, combs separate; best distinguished from similar species such as *melutensis* by the male hypopygium in which the styles are slightly curved and grade imperceptibly into the coxites, anal point broad, IXth tergite conical.

Male. Wing length 1·75–2·0 mm.

Head green or yellowish, scape reddish or brown, A.R. 2·5, frontal tubercles absent. *Thorax* green or yellowish; stripes, postnotum and sternopleuron reddish-yellow or partially brown. *Legs* green or yellowish, anterior tarsi slightly brownish, L.R. 1·75, tarsal beard absent; combs separate but touching, each with a well-developed spur. *Wings* plain, halteres green. *Abdomen* green; hypopygium (Text-fig. 12, *h*) with a broad anal point set on conical IXth tergite; styles slightly curved and merging imperceptibly into coxites; appendage 1 curved, 2 reduced but distinguishable as a hairy lobe.

Female not known.

Holotype male SUDAN: Liednum nr. Wau, iii–iv.1955 (*E. T. M. Reid*) in British Museum. Paratypes, BELGIAN CONGO: 3 ♂, Elisabethville, iii–iv.1939 (*H. J. Brédo*) in Institut Royal des Sciences Naturelles de Belgique.

Chironomus (Cryptochironomus) brincki nom. nov.

Cryptochironomus biclavatus Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 373 (not *Chironomus biclavatus* Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 384).

Dark brown, thorax pruinose, hypopygium with curved styles and two broad coxite appendages. Easily recognized by the presence of only one spur on the posterior tibiae. The original description was from a spirit specimen, now that a second pinned one is available, the colour is seen really to be a good deal darker. With the use of *Cryptochironomus* as a subgenus, the name *biclavatus* falls as a homonym.

Male. Wing length 2 mm.

Head, palpi and antennae dark brown, A.R. 1·5. *Thorax* dark brown and pruinose; stripes, postnotum and sternopleuron blackish. *Legs* dark brown, L.R. 1·8, tarsi not bearded, pulvilli rather small for the genus, posterior four tibiae with a single spur only, combs fused. *Wings* plain, halteres pale. *Abdomen* dark brown; hypopygium (Text-fig. 12, *i*) with curved styles and well-formed anal point; both coxite appendages present, the upper one strongly clubbed, the lower one less so.

Female not known.

Holotype male in Lund University collection, locality CAPE PROVINCE: Rhodes.

DISTRIBUTION. Apart from the holotype I have seen NATAL: 1 ♂, Tugela R., Royal Natal National Park, 4,500 ft., ix.1953 (*A. D. Harrison*).

Chironomus (Cryptochironomus) rhodesianus Kieffer

Cryptochironomus rhodesianus Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 387.
Chironomus (*Cryptochironomus*) *ater* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 176 (SYN. NOV.).
Cryptochironomus rudebecki Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 373 (SYN. NOV.).

Totally black except for four posterior tibiae and tarsi which are mainly yellowish, hairs pale. Distinguished from *nigrocorporis* by the black anterior tarsi and pale posterior tibiae and by the more elongate styles.

Examination of Kieffer's type has shown that *ater* must fall as a synonym. I described *rudebecki* from a spirit specimen and I am now convinced that it is the same as *rhodesianus*; the slight differences in the male hypopygium are caused through compression of the mount by the coverslip.

Male. Wing length 2·5 mm.

Head, mouthparts and scape black, flagellum brown, plumes black, A.R. rather more than 3, frontal tubercles absent. *Thorax* completely black, with some pruinosity but shining on the stripes. *Legs* black except for middle and posterior tibiae and tarsi which are yellowish and darkened at the ends of the segments, in one specimen the tarsi are mainly black; L.R. 1·25, tarsal beard present, combs fused, two spurs present. *Wings* unmarked, halteres black. *Abdomen* black with white hairs; hypopygium (Text-fig. 12, *j*) with curved styles which are not separated from the coxites; IXth tergite conical, anal point well formed, a single broad, hairy coxite appendage present, appearing double from above.

Female not known.

Holotype male of *rhodesianus* in South African Museum, of *ater* in British Museum, and of *rudebecki* in Lund University Museum.

DISTRIBUTION. CAPE PROVINCE: Type series of *ater*, Berg R., Piquetberg, Sout River Dam and Tulbagh Barrage; 1 ♂, Graaf Reinet, x.1931 (*A. Mackie*). BECHUANALAND: holotype male of *rudebecki*, Lobatsi. S. RHODESIA: Holotype male of *rhodesianus*, Salisbury.

Chironomus (Cryptochironomus) hirsti sp. n.

Green with reddish-yellow thoracic markings; distinguished from other similarly marked species by the male hypopygium, especially the evenly curved and rather stout styles.

Male. Wing length 1·5–1·8 mm.

Head yellowish or green, antennae yellowish, A.R. about 2, frontal tubercles probably absent. *Thorax* green; stripes, postnotum and sternopleuron reddish-yellow, stripes more or less fused. *Legs* uniformly yellowish, L.R. 2, tarsal beard absent, combs separate, each with a spur. *Abdomen* green, hypopygium (Text-fig. 13, *a*) with stout curved styles, thin anal point and broad appendage 1, appendage 2 just distinguishable.

Female not known.

Holotype male SUDAN: Khartoum, x.1951 (*D. J. Lewis*) and paratypes SUDAN: 1 ♂, Halfa (*S. Hirst*); 1 ♂, Makwar, ii.1923 (*S. Hirst*) all in British Museum.

Further paratypes BELGIAN CONGO: 7 ♂, Maka Lualaba, i.1939 (*H. J. Brédo*); 1 ♂, Eala, ix.1936 (*J. Ghesquière*) all in Institut Royal des Sciences Naturelle de Belgique.

Chironomus (Cryptochironomus) unicalcar nom. nov.

Kribiocryptus flaviventris Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 45 (not *Chironomus flaviventris* Johannsen, 1907, *Lawr. Kans. Univ. Sci. Bull.* **4** : 111).

A small species with dark brown thoracic stripes and yellowish-brown abdomen, readily separated by the single tibial spur on the posterior legs and by the " waisted " form of the male styles; the other species with a single spur (*brincki*) is larger and has a completely different male hypopygium. Although Kieffer gave the length of his specimen as 3 mm., there can be little doubt that the material described here is of the same species because of the similarity of the male hypopygium to his figure and the presence of only one tibial spur. Altering the genus to *Chironomus* makes *flaviventrius* a homonym.

Male. Wing length 1·5 mm.

Head, antennae and mouthparts brown, A.R. about 1·5, frontal tubercles absent. *Thorax* yellowish-brown, stripes, postnotum and sternopleuron dark brown. *Legs* yellowish-brown, last tarsal segment flattened on all legs, pulvilli well formed, L.R. 1·5, tarsal beard absent, combs of posterior four tibiae fused and carrying a single spur only. *Wings* plain, halteres yellow, squama bare. *Abdomen* yellowish brown or brown; hypopygium (Text-fig. 13, *b*) with very characteristically shaped styles, appendage 1 slightly clubbed, 2 just distinguishable, anal point narrow and pointed.

Female very similar to male in colour; segments 3–5 of antennae oval, 6 equal to 4 and 5 together.

Holotype male probably lost, locality SUDAN: South of Khartoum between Wad el Zaki and Shabasha Shary.

DISTRIBUTION. SUDAN: 9 ♂, Wad Medani, ii.1952 (*D. J. Lewis*); 5 ♂, Tonga, Adok and Shambe, xi.1953 (*E. T. M. Reid*). CAPE PROVINCE: 2 ♂, 1 ♀, Berg R., Piquetberg ; 1 ♂, Wellington, v.1953 (all coll. *K. M. F. Scott*).

Chironomus (Cryptochironomus) pullatus sp. n.

A small black species with reduced tibial spurs which are hardly longer than the combs. Separable from the other black species by the absence of velvety bands on the abdomen, by the small size and by the shape of the male styles.

Male. Wing length 1·5 mm.

Head, antennae and mouthparts black, frontal tubercles absent, A.R. about 1·5. *Thorax* quite black and slightly shining. *Legs* dark brown, L.R. 1·5, tarsal beard absent, fifth tarsal segment of all legs flattened, pulvilli well developed; combs separate, but the spurs are short and hardly project beyond the combs; spurs distinguishable in slide preparations by their thickness and dark colour. *Wings* plain, squama with slight fringe, halteres black. *Abdomen* black; hypopygium (Text-fig. 13, *c*) with curved styles and single bilobed coxite appendage.

Female not known.

Holotype male and 10 ♂ paratypes SUDAN: Khartoum, x.1951 and 6 ♂, i.1953 (*D. J. Lewis*) all in British Museum.

Chironomus (Cryptochironomus) graminicolor Kieffer

Cryptochironomus albiforceps Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 160 (not *Chironomus albiforceps* Kieffer, 1910, *Mem. Ind. Mus.* **2** : 231).

Cladopelma albiforceps var. *pubescens* Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 280.

Cryptochironomus graminicolor Kieffer, 1925, *ibid.* : 287.

Chironomus (*Cryptochironomus*) *reductus* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 177 (SYN. NOV.).

A small green species with brown or black thoracic markings; A.R. about 1, L.R. 2, front legs dark, male hypopygium with broad coxite appendage and long anal point.

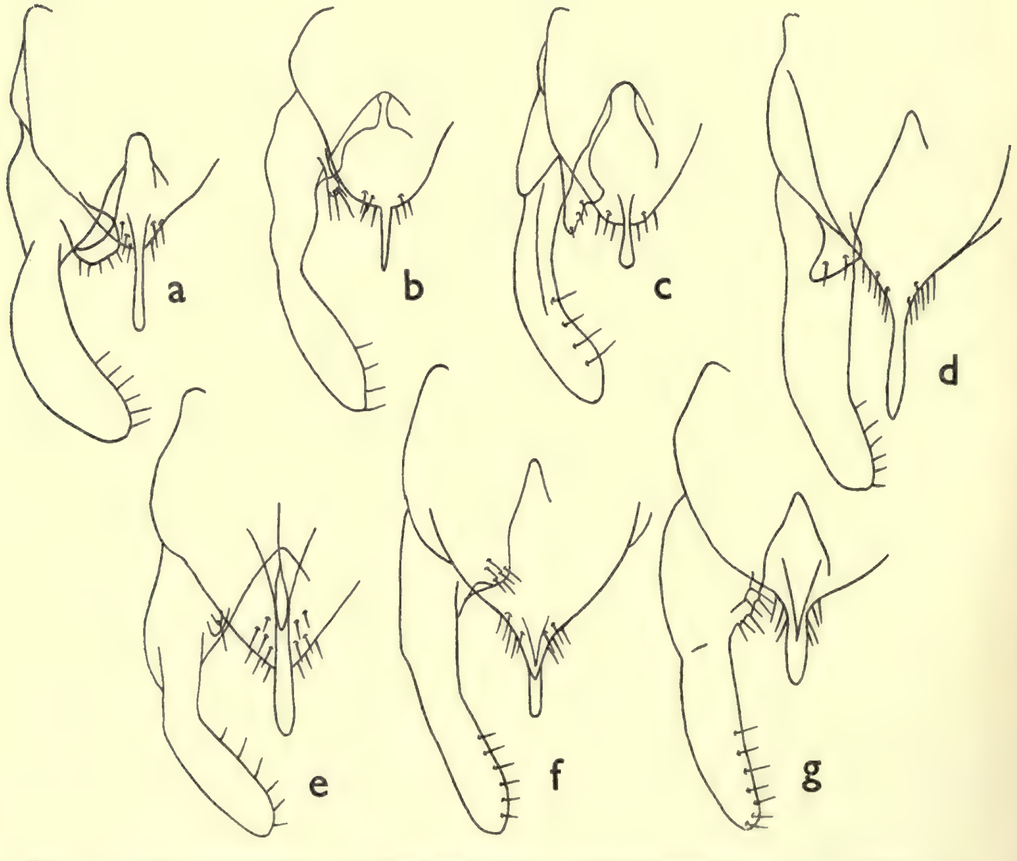

FIG. 13. Male hypopygia of *Chironomus* subg. *Cryptochironomus*. (*a*) *C. hirsti* ; (*b*) *C. unicalcar* ; (*c*) *C. pullatus* ; (*d*) *C. graminicolor* ; (*e*) *C. inflexus* ; (*f*) *C. lacteiforceps* ; (*g*) *C. nudiforceps*.

After examination of more material, it is now clear that my species is simply a paler form of *albiforceps*. Kieffer described his two species in the same paper (1923) but in different genera presumably because of his use of characters based on the minute pubescence of the pulvilli. As mentioned under the characters of the genus, it is my opinion that these characters do not exist. I choose *graminicolor* to replace *albiforceps* which is now a homonym, because of the doubtful status of *pubescens*.

Male. Wing length 1·5 mm.

Head green, antennae either brown or black, A.R. about 1 or slightly higher, frontal tubercles indistinguishable in dry specimens. *Thorax* green with some pruinosity; stripes, postnotum and sternopleuron usually black in Sudan specimens, but some paler forms do occur in South Africa in which parts of the thoracic markings are brown. *Legs* yellowish-brown or green, front legs more or less darkened; L.R. 2 or slightly more, beard absent; combs distinctly separated, each with a short spur. *Wings* plain, halteres green, squama bare. Abdomen green; hypopygium (Text-fig. 13, *d*) with long anal point, styles not separated from coxites and rather broad; a single broad coxite appendage, often slightly foot-shaped.

Female similar to male in colour; antennal segments 3–5 oval, 6 equal to 4 and 5 together.

Types of Kieffer's species probably lost; type locality of *albiforceps* SUDAN: Shambe; of *pubescens* EGYPT: Cairo; of *graminicolor* EGYPT: Maadi. Holotype male of *reductus* in British Museum, locality CAPE PROVINCE: Piquetberg.

DISTRIBUTION. SUDAN: 7 ♂, 2 ♀, Khartoum, ii.1952 (*D. J. Lewis*). NATAL: 1 ♂, 1 ♀, Tugela R., Royal Natal National Park, and 1 ♂, Mooi R., Rosetta, ix.1953 (*A. D. Harrison*). CAPE PROVINCE: type series of *reductus* from Berg River.

Chironomus (Cryptochironomus) inflexus sp. n.

A dark brown species with white antennal plumes, thorax uniformly covered with grey pruinosity; most easily distinguished from similarly coloured species such as *cinereithorax* by the male hypopygium with its bent styles and very small coxite appendages.

Male. Wing length 2·0 mm.

Head, antennae and mouthparts brown, plumes of antenna white, frontal tubercles absent, A.R. about 2·5. *Thorax* dark brown, uniformly covered with grey pruinosity through which stripes can just be distinguished, bristles white. *Legs* with anterior pair and femora of others brown, four posterior tibiae and tarsi paler, apices of tibiae darkened; L.R. 1·5, anterior tarsi bearded, tibial combs fused, each with a spur. *Wings* plain, whitish, halteres yellow, squama fringed. *Abdomen* dark brown; hypopygium (Text-fig. 13, *e*) with bent styles and very small coxite appendages; anal point strong and carried forwards as a ridge on IXth tergite.

Female similar to male in colour except for legs which are rather darker; segments 3–4 of antennae with short necks, 5 rather spindle-shaped, 6 equal to 4 and 5 together.

Holotype male and paratype female SUDAN: Khartoum, x.1951 (*D. J. Lewis*), both in British Museum.

Chironomus (Cryptochironomus) lacteiforceps Kieffer

Cryptochironomus lacteiforceps Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 163.

Green with reddish or yellowish-brown thoracic markings; legs uniformly pale, combs fused; male hypopygium lacking coxite appendages, separated from *nudiforceps* by its larger size and bent male styles.

Male. Wing length 2–2·3 mm.

Head and mouthparts greenish, small frontal tubercles present; antennae yellowish, pedicel reddish, A.R. 2·5. *Thorax* yellowish-green; stripes, postnotum and sternopleuron reddish or yellowish-brown. *Legs* yellowish-green, anterior ones not darker except sometimes at apices of tibiae; L.R. 1·5, beard absent, combs narrow and fused, two spurs present. *Wings* plain, halteres pale, squama fringed. *Abdomen* green; hypopygium (Text-fig. 13, *f*) not unlike *inflexus* in general appearance but coxite appendages completely absent and coxite with an inner lobe, style not as strongly bent, anal point without the ridge, IXth tergite produced so that in side view anal point appears like a downcurved finger at the end.

Female resembles male in colour; segments 3–5 of antenna oval, 6 as long as 4 and 5 together.

Type series probably lost, locality SUDAN: Shambe.

DISTRIBUTION. UGANDA: Series of both sexes at light, L. Victoria (*W. W. Macdonald* and *P. S. Corbet*). BELGIAN CONGO: 6 ♂, Elisabethville, xii.1938. TRANSVAAL : 1 ♂, Assegai R., nr. Piet Retief, ix.1954 (*A. D. Harrison*).

Chironomus (Cryptochironomus) nudiforceps Kieffer

Cryptochironomus nudiforceps Kieffer, 1923, *Ann. Soc. ent. France*, **92** : 160.

Chironomus (*Cryptochironomus*) *monilis* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 19; Freeman, 1955, *Explor. Parc Nat. Albert*, Miss. de Witte, fasc. **83** : 18 (SYN, NOV.).

Chironomus (*Cryptochironomus*) *atrofasciatus* Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 177 (SYN. NOV.).

A green species, very similar to but slightly smaller than *albiforceps*; most easily distinguished by the hypopygial structure, the styles being straight and the coxite less produced inwardly.

I now have material from the Sudan which has enabled me to identify Kieffer's species with certainty and I can find no reason for keeping *monilis* separate. *C. atrofasciatus* appears to be simply a darker form of the same species.

Male. Wing length 1·5–2·0 mm.

Head greenish, antennae yellowish-brown, A.R. about 2, frontal tubercles absent. *Thorax* green; stripes, postnotum and sternopleuron reddish-brown or dark brown. *Legs* green, anterior tibiae and tarsi brown or blackish, L.R. about 2, beard absent, combs fused and with two short spurs. *Wings* plain, squama fringed, halteres green. *Abdomen* green; hypopygium (Text-fig. 13, *g*) with straight styles which are more or less fused to coxites; coxites lacking appendages though with a fold where they would normally arise; inner margin rounded and setose; IXth tergite more transverse than in *lacteiforceps*, anal point appearing shorter.

Female similar to male in colour; segments 3–5 of antennae oval, 6 nearly as long as 3–5 together.

Type series of *nudiforceps* probably lost, locality SUDAN: between Wad el Zaki and Shabasha Shary. Holotype males of *monilis* and *atrofasciatus* in British Museum, both from CAPE PROVINCE: Berg R., Piquetberg.

DISTRIBUTION. SUDAN: 2 ♂, 2 ♀, Nile above Alaki, i.1923 (*S. Hirst*); 1 ♂, Khartoum, ii.1923 (*S. Hirst*); 1 ♂, Khartoum, ii.1952 (*D. J. Lewis*); 1 ♂, Shambe, ix.1953 (*E. T. M. Reid*). BELGIAN CONGO: Series from Parc National Albert (*Damas* and *Verbeke*). NATAL: 2 ♂, Mooi R., ix.1953 (*A. D. Harrison*). CAPE PROVINCE: Berg R., Piquetberg.

Unrecognized Species of Cryptochironomus

Besides species which I have been able to recognize, the following 12 were described by Kieffer from the female alone and have so far proved to be unrecognizable, at any rate from the existing collections. It is probable that at least some will never be recognized, especially as the types of eight of them are lost.

1. *Chironomus tropicalis*, Kieffer, 1913, *Voy. Alluaud Jeannel Afr. Or. Ins. Dipt.* **1** : 17. This is possibly an earlier description of *C.* (*Cryptochironomus*) *lindneri*, but the type, which is in the Paris Museum, requires re-examination for definite identification. Type locality KENYA: Naivasha.

2. *Chironomus kikuyui* Kieffer, 1913, *Ibid.* : 18. This again may be *lindneri* although the anterior legs are pale. The type is also in the Paris Museum and must be re-examined for definite identification. Type locality KENYA: Kijabé.

3. *Chironomus brevicornis* Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 70. I have seen the type which is in the Hungarian National Museum. It is a small green female of a species of *Cryptochironomus* 1·8 mm. long and the species is quite unrecognizable. Type locality ETHIOPIA: Lac Dembel.

4. *Cladopelma oculare* Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 51. Kieffer states that the eyes practically meet below, presumably he means above the mouthparts although this is not stated; that the mesonotal stripes are brown, the central being joined to the posterior border by a line; and that nearly the distal halves of the femora are black; length 5 mm. No such species is known to me, although the pattern suggests *Chironomus* (*Dicrotendipes*) *regalis* Goetghebuer. Type locality FRENCH CAMEROONS: Kribi, type probably lost.

5. *Cladopelma nilotes* Kieffer, 1922, *Ibid.* **91** : 53. A yellowish insect, cross-vein brown-black, knees and apices of tibiae darkened, posterior border of abdominal tergites 2–6 with a small dark spot each side, length 4·5 mm. This may be the female of a species of *Chironomus* sens. str. Type probably lost, locality SUDAN: Shambe.

6. *Cryptochironomus subfusiformis* Kieffer, 1923, *Ibid.* **92** : 158. Brownish-yellow, 2 mm. long, segments 3–5 of antennae fusiform, palpi short, L.R. 2·25. Type probably lost, locality FRENCH CAMEROONS: Kribi.

7. *C. nilophilus* Kieffer, 1923, *Ibid.* **92** : 158. Whitish, length 2·5 mm., segments 3–5 of antennae oval, palpi short, mesonotal stripes sandy coloured, anterior tibia

and apical two-thirds of femur brown. Type probably lost, locality SUDAN: Shambe.

8. *C. ocularis* Kieffer, 1923, *Ibid.* **92** : 159. Pale yellow, length 2 mm., eyes separated by two-thirds of their length, segments 3–5 of antennae oval, legs whitish. Type probably lost, locality SUDAN: S. of Khartoum. This may be *forcipatus* Freeman.

9. *C. baeus* Kieffer, 1923, *Ibid.* **92** : 159. Length 1·5 mm. Separated from previous species only by the eyes being about half their length apart. Type probably lost, locality SUDAN: Shambe. This is possibly a synonym of *ocularis*.

10. *C. pumilio* Kieffer, 1923, *Ibid.* **92** : 162. Entirely pale yellow, length 1·8 mm. Distinguished from other pale species by the eyes being separated by only half their terminal width. Type probably lost, locality SUDAN: Mongola.

11. *C. pygmaeus* Kieffer, 1923, *Ibid.* **92** : 165. Yellowish-white, length 1·5 mm. Pulvilli said to be narrow, eyes separated by one and a half times their terminal width. Type probably lost, locality FRENCH CAMEROONS: Kribi.

12. *Psectrocladius rhodesiae* Kieffer, 1924, *Ann. Soc. sci. Brux.* **43** (1) : 260. I have seen the type which is in South African Museum and have found it to be a much damaged female of a species of *Cryptochironomus* very similar to *forcipatus* but with darker legs. I prefer to regard it as an uncertain species for the present. Type locality S. RHODESIA: Salisbury.

Genus ***NILODOSIS*** Kieffer

Nilodosis Kieffer, 1921, *Ann. Soc ent. France,* **90** : 30 ; Kieffer, 1922, *ibid.* **91** : 48 ; Freeman, 1957, *Explor. Hydrobiol. L. Kivu, Ed., Albert,* Bruxelles **3** : 215.

Fairly large dark species, thorax with grey pruinosity; frontal tubercles absent; male antenna with 14 segments, female with 6; palpi not reduced. Prothorax two-lobed and rather similar to *Chironomus* subgenus *Endochironomus* but may be more reduced; anterior tibia with long curved spine on conical scale (Text-fig. 2, *c*), posterior tibiae with separate conical combs each carrying a short spur, pulvilli absent. Wings faintly clouded, R_{2+3} ending near midway between R_1 and R_{4+5}, posterior fork below cross-vein, squama fringed. Abdomen of the female of at least the type species (*N. fusca* Kieffer), ending in a curved finger-shaped process. Male hypopygium with two coxite appendages, styles rather long and narrow.

Although this genus resembles *Chironomus* (*Endochironomus*) in many ways, the strong anterior tibial spur and the absence of pulvilli are probably sufficient for it to be considered distinct. The combs do not differ from those of other genera, as stated by Kieffer. Only two species of the genus are known, both from Africa south of the Sahara.

KEY TO SPECIES OF *Nilodosis* KIEFFER

Thorax with three or five longitudinal silvery stripes, male tarsus not bearded, appendage 1 of hypopygium elongate (Text-fig. 14, *b*)	*fusca* Kieffer
Thorax uniformly grey or with only indistinct stripes, male tarsus bearded, appendage 1 broad, sometimes hooked (Text-fig. 14, *a*)	*grisea* Freeman

Nilodosis fusca Kieffer

Nilodosis fusca Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 48.
Endochironomus ituriensis Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 461 (SYN. NOV.).

Blackish, thorax strongly pruinose, especially along the hair lines to give a three-striped appearance, female may have lateral margins silvery as well; tarsi yellowish, at least basally on basitarsus; wings with faint grey tinge and with pale spots near the apices of the cells; female abdomen with curved finger-like process at apex.

Male. Wing length 2·5–3·5 mm.

Head and mouthparts dark brown, frontal tubercles absent, A.R. 2·5. *Thorax* with grey or shimmering pruinosity on a dark brown or blackish background; hair lines especially pruinose and stand out as three silvery grey lines, hairs whitish; prothorax just visible from above. *Legs* blackish, extreme bases of femora and of tibiae yellowish, tarsi with segments 1–2 or 1–3 yellowish on basal half or more; anterior basitarsus may be yellow with dark apex or there may be an additional broad central dark band; anterior tibia with strong curved spur, L.R. about 1·9, pulvilli absent. *Wings* (Pl. 1, fig. *j*) grey tinged and with three pale areas at apices of cells and pale areas in anal cell. Halteres brown. *Abdomen* very dark brown or blackish, with pale hairs. Hypopygium (Text-fig 14, *b*) with elongate style and appendage 1.

Female resembles male in colour and general structure but is often darker; lateral mesonotal margins may be silvery, making five stripes in all; segments 3–5 of antennae with short necks, 6 equal to 4 and 5 together; wing length may be as much as 4·5 mm. Abdomen with last tergite produced backwards as a curved finger-like process longer than the cerci.

The type series of *fusca* is probably lost, type locality SUDAN: Shambe; I have seen the type male of *ituriensis* in Musée Royal du Congo Belge and can confirm its identity, type locality BELGIAN CONGO: Ituri, Mahagi-Port.

DISTRIBUTION. GOLD COAST: 1 ♂, Red Volta, Nangodi, x.1954 (*G. Crisp*). NIGERIA : 1 ♂, Eket, vii.1911. SUDAN: 5 ♂, 1 ♀ Liednum, nr. Wau, iii–iv.1955 (*E. T. M. Reid*). UGANDA: 2 ♀, Busungwe Bay, ix–x.1954 (*P. S. Corbet*). BELGIAN CONGO: 1 ♂, Basoko, ii.1925 (*Del Javero*).

Nilodosis grisea Freeman

Nilodosis grisea Freeman, 1957, *Explor. Hydrobiol. L. Kivu. Ed. Albert*, Bruxelles **3** ; 215.

Very similar to *fusca*, but prothorax more reduced, mesonotum not distinctly striped, wing pale areas more extensive and appendage 1 of male hypopygium broad; in addition the male tarsi are bearded.

Male. Wing length 3.0 mm.

Head blackish or dark grey, antennal flagellum brown, plumes pale, A.R. about 3, frontal tubercles absent. *Thorax* covered with plain grey dusting and without distinct stripes; dorso-central bristles pale and not very conspicuous; prothorax more reduced than in *fusca* and not visible from above. *Legs* mainly blackish; basitarsi, anterior tibiae centrally and bases of femora yellowish; L.R. 1·75, anterior tarsi with sparse beard, pulvilli absent; anterior tibial scale conical and ending in a curved spur. *Wings* faintly clouded and with pale areas more extensive than in *fusca* and reaching the margin of the wing, cross-vein blackened; halteres dark. *Abdomen* black and with pale hair; hypopygium (Text-fig. 14, *a*) with long coxites and straight styles; appendage 1 short and broad, with long hairs and sometimes a slight hook at the apex; appendage 2 short and with long curved hairs.

Female not known.

DISTRIBUTION. Known only from the type series of 5 ♂, BELGIAN CONGO: Albertville, viii.1953 (*J. Verbeke*). Holotype in Institut Royal des Sciences Naturelles de Belgique.

Genus *HENRARDIA* Goetghebuer

Henrardia Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 455.

Male antenna with 14 segments, female with 6; palpi normal; frontal tubercles absent; pronotum not visible from above, of medium development; anterior tibial scale oval and with a short sharp spine; middle tibia with outer comb armed with four spurs (Text-fig. 14, *d*), posterior tibial combs fused and each with a single spur; pulvilli present; wings clear, R_{2+3} separated from R_1 at apex, posterior fork slightly distal to cross-vein. Male hypopygium rather similar to some species of *Polypedilum*, styles rounded at apex, appendage 1 narrow, appendage 2 with a long hair at apex.

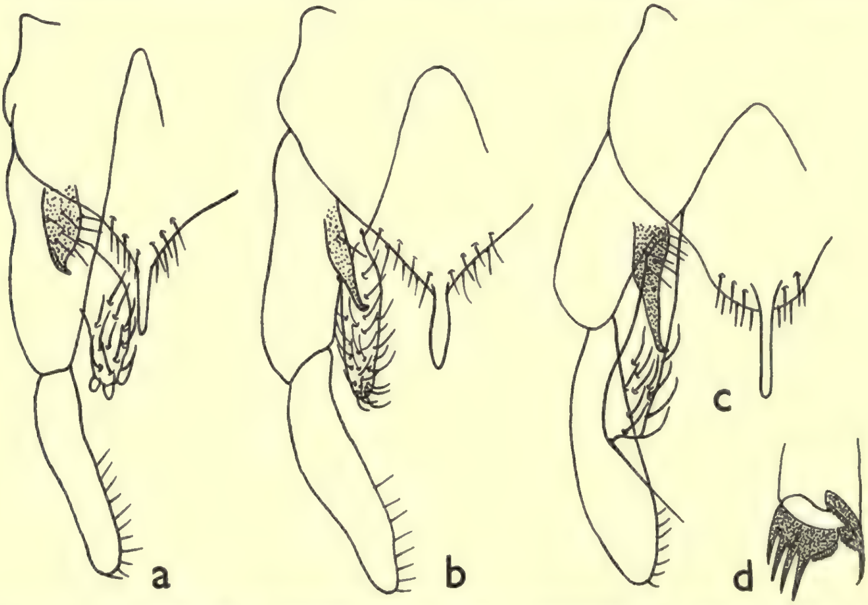

FIG. 14. *Nilodosis* and *Henrardia*; (*a*)–(*c*) male hypopygia, (*d*) apex of middle tibia. (*a*) *N. grisea*; (*b*) *N. fusca*; (*c*) and (*d*) *H. quadrispinosa*.

Only one species, the type of the genus, is known. It seems unlikely that the mid-tibial comb is aberrant, because nine specimens from five localities all show the same feature.

Henrardia quadrispinosa Goetghebuer

Henrardia quadrispinosa Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 455.

Medium-sized, brown, abdomen with pruinose bands ; easily distinguished from other African species of the subfamily by the four spurs on the outer comb of the middle tibia.

Male. Wing length 2·5–3·0 mm.

Head, mouthparts and antennae brown, A.R. about 3. *Thorax* brown, lightly pruinose, bristles long and brown. *Legs* pale brown, anterior pair slightly darker, L.R. 1·3, anterior femur and tibia subequal. *Wings* unmarked, squama fringed. *Abdomen* brown, each segment pruinose at the apex ; hypopygium (Text-fig. 14, *c*) as described above.

Female similar to male in colour and leg structure ; segments 3–5 of antenna with long necks, whorl hairs long, those of segment 5 reaching beyond apex of 6, which is less than twice as long as segment 5.

I have seen the holotype male which is in Musée Royal du Congo Belge, type locality BELGIAN CONGO : Nyangwe.

DISTRIBUTION : FRENCH WEST AFRICA : 1 ♂, Haute Volta, Tougan, xi.1954 and 2 ♂, Bobo Dioulasso, ix. 1956 (*J. Hamon*). BELGIAN CONGO : 2 ♀, Eala, iii–iv.1936 (*J. Ghesquière*) ; 3 ♂, Nyangwe, iv.1924 (*F. Henrard*) ; 1 ♂, Maka Lualaba, 1.1939 (*H. J. Brédo*).

Genus ***STENOCHIRONOMUS*** Kieffer

Stenochironomus Kieffer, 1919, *Ent. Mitt.* **8** : 44 ; Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 56 ; Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 459 ; Townes, 1945, *Amer. midl. Nat.* **34** : 84.
Chironomus subgenus *Stenochironomus* Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 395.

Antennae of male with 14 segments, of female with 6 ; frontal tubercles absent, palpi not reduced. Pronotum much reduced and far surpassed by the mesonotum which projects as a cone over the head ; acrostichal bristles long and easily visible as a double row extending back to the middle of the scutum. R_{2+3} close to R_1 at the apex, wing membrane without macrotrichia, squama fringed. Scale of anterior tibia elongate and sometimes with a short spur at the tip, pulvilli well developed, combs of middle and posterior tibiae fused, each with a spur in most species, the inner spur may occasionally be reduced or absent. Male hypopygium very characteristic, anal point usually standing up and bent at the apex, appendage 1 short and inconspicuous, appendage 2 long, narrow and curved, with an articulated spine and a number of long hairs at the tip, styles long and with a few long hairs on their inner margin.

Goetghebuer fixed the type species as *S. gibbus* Fabricius (= *S. flexilis auctt. nec* Linnaeus), a fixation which invalidates Townes's later fixation of *S. pulchripennis*.

Stenochironomus is a distinctive genus, readily recognizable by the greatly produced mesonotum, well-developed acrostichal bristles and peculiar male hypopygium ; the cone-shaped mesonotum resembles that of *Microtendipes* and *Collartiella*. The species from Africa south of the Sahara are not at all easy to separate from each other because they are uniform in structure and variable in colour. The male genitalia do not offer clear and concise characters for the separation of the species and are of doubtful value for this purpose, although I have described and figured them wherever possible. It seems that the concept of each species is best built up from the general facies and pattern rather than on more definite structural and colour characters.

Kieffer has described seven African species, all from Kribi in the French Cameroons, the types of which are probably lost. Two of these have colour patterns but the other five are all pale and unmarked and were separated by Kieffer on details of the structure of the pulvilli and male hypopygium. As explained under *S. spatuliger* below, not all of these differences can be accepted and it seems likely that no more than two and possibly only one species is present in these pale forms. Goetghebuer has described two species, placing one in *Chironomus* s. str.; this is probably a synonym of one of Kieffer's species,

Key to African Species of *Stenochironomus*

1.	Thorax without dark markings ; legs pale	2
	Thorax with at least a pair of dark spots on the lateral stripes ; legs often partially dark	4
2.	Posterior tibia with a single spur only	***harrisoni*** **sp. n.**
	Posterior tibia with two spurs	3
3.	Anal point of male enlarged at apex only (Text-fig. 15, *a*)	*spatuliger* Kieffer
	Anal point of male broadened along its length (Text-fig. 15, *b*)	*polychaetus* Kieffer
4.	Wings with a dark transverse band near the middle	5
	Wings either unmarked or darker in basal half (cf. *bipunctatus*)	8
5.	Wing markings more extensive (Pl. 1, fig. *l*)	*edwardsi* Freeman
	Wing markings more in the form of a transverse band	6
6.	All knees black	*pustulatus* Freeman
	Dark markings on legs confined to anterior tibiae, or tibiae completely pale	7
7.	All legs completely pale	*bipunctatus* Kieffer
	Anterior tibiae dark at base and apex	*micronyx* Goetghebuer
8.	All femora and tibiae black	*albicoxa* sp. n.
	At least middle femora and tibiae pale	9
9.	Anterior tibial scale with small spur (Text-fig. 2, *e*)	*atroconus* Freeman
	Anterior tibial scale unarmed	*antennalis* Kieffer

Stenochironomus spatuliger Kieffer

Stenochironomus spatuliger Kieffer, 1922, *Ann. Soc. ent. France*, **91** : 60.
? *Stenochironomus trispinosus* Kieffer, 1922, *ibid.* **91** : 60.
? *Stenochironomus pygmaeus* Kieffer, 1922, *ibid.* **91** : 58.

A small pale yellowish or pale green species without dark markings, any dark areas on abdomen being caused by gut contents ; anterior tibial scale unarmed, posterior tibial combs each with a spur. Distinguished from *polychaetus* by the narrower anal point of the male which is not enlarged basally.

Of the five pale species described by Kieffer in 1922 from Kribi, *pygmaeus* was separated from the others by the narrower pulvilli, but the hypopygium as drawn by Kieffer is almost identical with that of *spatuliger*. The width and branching of the pulvilli was often used by him for separating species and genera but I have seldom been able to appreciate these differences and am forced to conclude that he must have examined them from different aspects. I am therefore treating *pygmaeus* as a probable synonym of *spatuliger* even though the size quoted by Kieffer is rather small.

The other four species were separated by the direction in which the apical spine of appendage 2 pointed, by the number and disposition of the hairs on appendage 1 and by the shape of the anal point. The apical spine is movable to a certain extent and may differ in angle on the two sides of the same specimen, which renders this character useless. Appendage 1 bears setae in all the species that I have been able to examine, but they are often difficult to distinguish which may account for the bare appendages figured for *pygmaeus* and *kribiensis*. The three apical hairs of *spatuliger* are often closer together and easier to distinguish, no doubt causing Kieffer to draw only these three in the figures of *spatuliger* and *trispinosus*. In *polychaetus* he has drawn appendage 1 with the full number of hairs, but the pointed shape shows that it was drawn from the side, which is probably why more hairs were noticed.

There is a good case for considering all five to be descriptions of the same species but a specimen from Gold Coast has a wider anal point and probably represents *polychaetus*; whether it is really distinct or only a variety is not certain. The other specimens available to me agree well with *spatuliger*. A further series from Kribi might help to solve the problem of how many of these names are really valid but until then I prefer not to follow page priority but to use the more certain of the names, that is, *spatuliger* and *polychaetus* and to consider the others as probable synonyms of these.

Male. Wing length 1·5–2·0 mm.

Head, mouthparts and antennae pale yellow, frontal tubercles absent, A.R. about 1·5. *Thorax* whitish-yellow, stripes either indistinguishable or rather darker yellow, dorso-central bristles fairly close together, irregularly biserial posteriorly. *Legs* pale yellow, unmarked; anterior tibial scale unarmed, posterior tibial combs each with a spur, tarsal beard absent, L.R. hardly more than 1. *Wings* pale and unmarked, hairs of posterior fringe slightly flattened, halteres white. *Abdomen* very pale, any dark markings being caused by gut contents; hypopygium (Text-figs. 15, *a*, *g*) with narrow anal point which is broadened apically, lateral aspect as shown; appendage 1 with a row of hairs, appendage 2 and style normal for the genus.

Female similar to male in colour; antennal segments 3–5 with well-developed necks, segment 6 about one and a half times as long as 5.

Types of all three species probably lost, all from FRENCH CAMEROONS: Kribi.

DISTRIBUTION. SUDAN: 3 ♂, Khartoum, i.1923 (*S. Hirst*); 12 ♂, 6 ♀, Khartoum; x.1951 (*D. J. Lewis*). NIGERIA: 1 ♀, Alizaga, i.1955 (*R. W. Crosskey*). GOLD COAST: 5 ♂, 11 ♀, Red Volta, Nangodi, x.1954 (*G. Crisp*). BELGIAN CONGO: 2 ♂, 1 ♀, Elisabethville, ii.1939 (*H. J. Brédo*); 1 ♂, Maka Lualaba, i.1939 (*H. J. Brédo*).

Stenochironomus polychaetus Kieffer

Stenochironomus polychaetus Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 61.
? *Stenochironomus kribiensis* Kieffer, 1922, *ibid.* **91** : 59.

As explained under *spatuliger,* I am not adopting page priority for the name of this species. It is a small pale species, only separable from *spatuliger* by the broader anal point (Text-figs. 15, *b, h*) ; further material may show it to be a variety only.

Both types probably lost, both from FRENCH CAMEROONS : Kribi.

DISTRIBUTION. GOLD COAST : 1 ♂, near Kumasi, x.1952 (*J. Bowden*).

Stenochironomus bipunctatus Kieffer

Stenochironomus bipunctatus Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 57.
? *Chironomus bipustulatus* Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 472.

This species can be distinguished from all others known to me from Africa south of the Sahara by the presence of a pair of round black spots at the anterior ends of the lateral stripes, combined with completely pale legs and abdomen. Goetghebuer's specimen has the apex of the postnotum black as well.

I have been able to see Goetghebuer's type and find that the wing has a faint transverse cloud at the level of the cross-vein which he overlooked. Kieffer does not mention the cloud but he also may have overlooked it ; for this reason I am leaving the synonymy in doubt. Kieffer's figure of the male hypopygium is too generalized to be of any use for defining the species.

Kieffer gives the lengths as male 4 mm., female 2·5 mm.; Goetghebuer states his female to be 6 mm. long, but this is exaggerated, 3·25 mm. being the correct figure.

Type specimens of *bipunctatus* probably lost, locality FRENCH CAMEROONS : Kribi ; holotype female of *bipustulatus* is in the Musée Royal du Congo Belge, locality, BELGIAN CONGO : Vitshumbi. No further specimens are known to me.

Stenochironomus antennalis Kieffer

Stenochironomus antennalis Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 58 ; Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 375.

Thoracic stripes blackish and fused, anterior tibiae and sometimes femora dark ; shoulders, abdomen and remainder of legs pale ; distinguished from *atroconus* by its much smaller size and unarmed anterior tibial scale.

Male. Wing length 2 mm.

Head, mouthparts and antennae yellowish, frontal tubercles absent, A.R. about 1. *Thorax* mainly black because of the fused thoracic stripes ; sternopleuron and postnotum also black, anterior margin, shoulders and scutellum pale ; dorsocentral bristles pale and widely spaced. *Legs* yellow, anterior tibiae dark, apex of anterior femur vaguely darkened or whole femur yellowish-brown ; L.R. about 1·2 or less, scale unarmed, posterior tibial combs each with a spur. *Wings* unmarked, halteres pale. *Abdomen* yellow, hypopygium (Text-fig. 15, *c*) with narrow anal point, appendage 1 with three hairs at the apex and two near the base.

Female according to Kieffer's description very similar.

Holotype female probably lost.

DISTRIBUTION. Type locality FRENCH CAMEROONS : Kribi. Additional specimen, TRANSVAAL : 1 ♂, Kruger National Park, Skukuza, iv.1951 (*P. Brinck*).

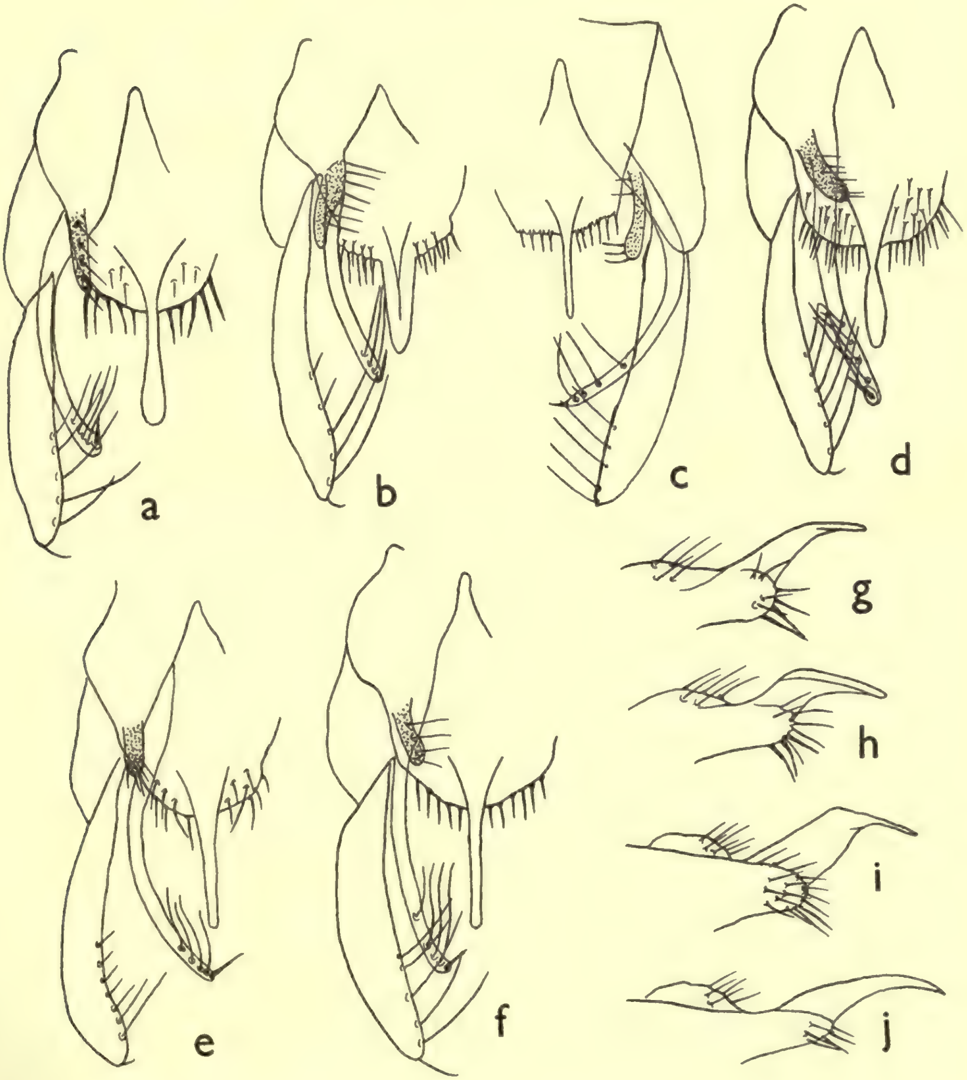

FIG. 15. Male hypopygia of *Stenochironomus* ; (*a*)–(*f*) in dorsal aspect, (*g*)–(*j*) anal point in lateral aspect. (*a*) *S. spatuliger* ; (*b*) *S. polychaetus* ; (*c*) *S. antennalis* ; (*d*) *S. atroconus* ; (*e*) *S. micronyx* ; (*f*) *S. edwardsi* ; (*g*) *S. spatuliger* ; (*h*) *S. polychaetus* ; (*i*) *S. atroconus* ; (*j*) *S. edwardsi*.

Stenochironomus albicoxa sp. n.

Medium-sized black species, only yellow on part of pleura, coxae and trochanters, tarsi and cerci (male not known); wings darkened along costal margin basally, halteres black; separated from *antennalis* by the darker thorax, black abdomen with yellow cerci and by all the femora and tibiae being black.

Female. Wing length 2·5–3·0 mm.

Head and mouthparts dark brown, antennae paler, last segment darkened, segments 3–5 with short necks, segment 6 slightly longer than 5. *Thorax* black and shining, except for a variable amount of the pleuron and sternopleuron which are partially or completely white; scutellum black; dorso-central bristles uniserial. *Legs* with coxae and trochanters white, all femora and tibiae black, all tarsi white, L.R. about 1·75; anterior tibial scale more or less pointed but without spur; posterior tibial combs each with a spur but inner spur may be very short. *Wings* (Pl. 1, fig. *k*) with a greater or lesser amount of darkening along costal margin in basal half; halteres black. *Abdomen* black, cerci yellow.

Holotype female BELGIAN CONGO: Elisabethville, xii.1932 (*C. Seydel*). Paratypes SUDAN: 1♀, Yirol, vi–vii.1954 (*E. T. M. Reid*). NIGERIA: 1 ♀, Niger Province, Abuja, xii.1954 (*R. W. Crosskey*). GOLD COAST: 3 ♀, Red Volta, Nangodi, x.1954 (*G. Crisp*). Whole series in British Museum.

Stenochironomus harrisoni sp. n.

Entirely green, wings unmarked; mesonotum more produced and narrower than usual, ending anteriorly in four small tubercles; easily distinguished from other species because middle and posterior tibiae have only a single spur on the combs.

Although only the female is known and the posterior tibiae has only a single spur, it is fairly certain that this species belongs to *Stenochironomus* because the scale of the anterior tibia is produced and well-developed acrostichal bristles are present. Variation in the number of posterior tibial spurs is seen in the Palaearctic species *S. hibernicus* Edwards, a species with well-developed acrostichal bristles and typical male hypopygium originally described in *Microtendipes*. Some specimens of *S. albicoxa* sp. n. also show the inner spur reduced though not absent.

Female. Wing length 3 mm.

Head pale green tinged with brown, antennae with segments 2–4 with well-developed necks, 5 completely lacking neck, 6 about one and a half times as long as 5. *Thorax* completely green; dorso-central bristles irregularly biserial, at any rate anteriorly and rather close together; anterior mesonotal cone narrower and longer than usual, ending anteriorly in four small tubercles, acrostichal bristles well developed. *Legs* with femora pale green, remainder more yellowish; L.R. about 1·8; pulvilli large, anterior tibial scale unarmed, posterior tibiae with inner comb lacking spur, spur on outer comb curved. *Wings* unmarked, halteres green. *Abdomen* green.

Holotype female TRANSVAAL: Pongola River Settlements, ix.1954 (*A. D. Harrison*) in British Museum.

Stenochironomus atroconus Freeman

Stenochironomus atroconus Freeman, 1955, *Explor. Parc nat. Upemba,* Miss. de Witte, fasc. **35** (6) : 99.

One of the largest African species known to me. Colour variable, in the female holotype the mesonotal cone is black, segments 1 and 2 of abdomen and most of anterior legs also black, but other specimens show a lesser amount of black on the thorax, the greatest reduction being in the males which have the black reduced to two round spots at the anterior ends of the lateral stripes. All specimens have anterior tibiae and tarsi black and some darkening of the femur ; wings unmarked ; anterior tibial scale armed with a short spur ; abdomen with some darkening on some basal segments.

Male. Wing length 3·25 mm.

Head, mouthparts and antennae yellowish-brown, A.R. 2·2. *Thorax* in the only two males known yellow, stripes reddish-brown, lateral ones with a large round spot at the anterior end ; dorso-central bristles sparse and uniserial. *Legs* yellow ; anterior tibiae and tarsi black, anterior femur dark at apex in one specimen ; L.R. 1·2, anterior tibial scale armed with a short spur (Text-fig. 2, *e*), posterior tibia with two spurs. *Wings* unmarked, halteres pale. *Abdomen* yellow, segments 1–3 with a dark band along posterior margin. Hypopygium (Text-figs. 15, *d*, *i*) with anal point flattened for apical half and strongly bent, IXth tergite more hairy than in other species.

Female. Wing length 3·25–4·0 mm.

In all the specimens I have seen, the central thoracic stripe is black in addition to the black spots at the anterior ends of the lateral stripes ; there is a tendency for the darkening to spread on to the shoulders and for fusion with the lateral spots so that the whole cone may be black as in the holotype. Anterior femur usually black on apical half, remainder of front leg black ; abdominal darkenings more extensive, especially on segments 1 and 2 which may be completely dark. Segments 3–5 of antenna with long necks, 6 one and a half times as long as 5 ; anterior tibial scale armed.

Holotype female in British Museum, type locality BELGIAN CONGO : Elisabethville.

DISTRIBUTION. GOLD COAST : 1 ♀, Red Volta, Nangodi, x.1954 (*G. Crisp*). HAUET VOLTA : 1 ♂, Banfora, xii.1956 (*J. Hamon*). NIGERIA : 2 ♂, Minna, xii.1954 (*R. W. Crosskey*). BELGIAN CONGO : 2 ♀, ii.1939 and 1 ♀, iv.1939, Elisabethville (*H. J. Brédo*) also the holotype ; 1 ♀, Parc National de l'Upemba ; 1 ♀, Maka Lualaba, i.1939 (*H. J. Brédo*).

Stenochironomus micronyx Goetghebuer

Stenochironomus micronyx Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 460.

Medium-sized, yellow species with two black marks on each lateral mesonotal stripe ; anterior legs with dark knees and dark tips to tibiae and tarsal segments ; wings with dark shade across the middle (omitted by Goetghebuer in his original description).

Male. Wing length 3–4 mm. Goetghebuer gives the length of the insect as 8 mm. but he seems to have included the antennae ; the maximum body length of his type is between 5 and 6 mm.

Head yellow, mouthparts brown, A.R. nearly 4. *Thorax* yellow ; lateral stripes with a round black spot anteriorly and an oval spot along the outer margin anteriorly ; central stripes in my specimen each with an elongate brown spot posteriorly, centre of prescutellar area also brown ; pleura whitish. *Legs* yellow, apex of anterior femur and as much as basal third of tibia dark, apices of anterior tibiae and anterior tarsal segments black ; L.R. 1·3, anterior tibial scale without definite spur, posterior tibial combs each with a spur. *Wings* with a faint, fairly broad, cloud or shade distal to cross-vein and posterior fork ; halteres pale. *Abdomen* yellow, each segment narrowly brown along the posterior margin ; hypopygium (Text-fig. 15, *e*) with long anal point, appendage 1 with about six hairs near the apex.

Female very similar to male in colouring but wing shade extends into base of wing ; antennae with segments 3–5 with long necks, 6 slightly longer than 5 ; in one specimen the inner margin of the lateral thoracic stripe is darkened.

I have seen the holotype male in Musée Royal du Congo Belge, locality BELGIAN CONGO : Mayumbe, Sumbi.

DISTRIBUTION. SIERRA LEONE : 3 ♀, Njala, x.1933, x.1934 and x.1935 (*E. Hargreaves*). GOLD COAST : 1 ♀, Kumasi (*W. Smith*). FRENCH CAMEROONS : 1 ♂, Douala, x.1952 (*J. Rageau*).

Stenochironomus edwardsi Freeman

Stenochironomus edwardsi Freeman, 1957, *Explor. Hydrobiol. L. Kivu, Ed., Albert,* Bruxelles **3** : 216.

A variable species with shoulders pale, stripes partially brown, abdomen white. Legs darkened above and below the knees, femora with additional and variable markings, wings with transverse dark band distal to cross-vein and posterior fork which spreads into anal cell, and with variable basal darkening. Distinguished from other African species by the colour pattern, structurally very similar to other species.

Male. Wing length 2–3 mm.

Head and pedicel yellowish-brown, mouthparts and flagellum darker, A.R. about 1·2. *Thorax* yellowish, shoulders whiter, anterior half of median stripe may be whitish, lateral stripes with variable amount of darkening especially anteriorly, scutellum and postnotum at least partially brown ; S. African specimens have all stripes and sternopleuron brown ; dorso-central bristles uniserial. *Legs* yellow and with variable markings ; Congo and Kenya specimens have apices of femora and bases of tibiae (half of anterior tibia) dark, anterior femora with central dark band, apices of tibiae and tarsal segments narrowly dark ; S. African specimens have femora with a good deal of darkening and a pale band in apical half, tibiae also darker ; L.R. about 1·4, anterior tibial scale unarmed, combs each carrying a spur. *Wings* (Pl. 1, fig. *l* of female) with a broad dark band distal to cross-vein and posterior fork spreading basally into anal cell, occupying half of fork cell and including an oval pale area in cell R_5 ; wing also dark at base in some specimens. Halteres whitish. *Abdomen* whitish-yellow, with vague posterior markings caused by gut contents. Hypopygium (Text-figs. 15, *f, j*) very similar to other species of the genus ; anal point long and narrow, evenly curved in lateral aspect, appendage 1 short and with a few hairs.

Female. Quite similar to male but usually rather darker and with more definite markings on basal halves of femora which have subapical pale bands as in S. African males. Congo female has also a sub-basal pale band on posterior and middle femora ; in this specimen the basal half of wing has a good deal of extra clouding. A large specimen from 10,000 ft. on Mt. Elgon has wing length over 5 mm. Antennal segments with well-formed narrow necks, 6 a little longer than 5.

Holotype male in British Museum.

DISTRIBUTION. KENYA : Mt. Elgon, holotype and paratype, Swam River, 5,000 ft., ii.1935 (*F. W. Edwards*), heath zone, 1 ♀, 10–11,500 ft., ii.1935 (F. W. *Edwards*). UGANDA : 1 ♀, Ruwenzori Range, Namwamba Valley, 6,500 ft. (*F. W. Edwards*). BELGIAN CONGO : 1 ♂, 1 ♀, Albertville, viii.1953 (*J. Verbeke*). TRANSVAAL : 3 ♂, 1 ♀, Lydenburg Distr., Waterval, iv.1935 (*A. D. Harrison*). NATAL : 1 ♂, Mt. Currie, Kokstad, iii.1953 (*G. H. Satchell*).

Stenochironomus pustulatus Freeman

Stenochironomus pustulatus Freeman, 1955, *S. Afr. Animal Life.* Uppsala, **2** : 375.

Easily distinguished from other African species by the presence of two black spots on thorax combined with blackened knees and a transverse dark band on the wing, basal to the posterior fork.

Male. Wing length 2 mm.

Head yellow, A.R. about 1. *Thorax* yellowish-white, stripes hardly indicated except for a rounded dark brown or black spot at anterior end of each lateral stripe, postnotum dark brown. *Legs* quite yellow except for knees which are sharply dark brown or black ; L.R. 1·2, anterior tibial scale unarmed, posterior tibial combs each with a spur. *Wings* (Pl. 1, fig. *m* of female) with a transverse brown band at the level of the cross-vein, but basal to posterior fork and with a small cloud at apex. Halteres white. *Abdomen* with segments 1–5 pale, remainder with some darkening probably caused by gut contents ; hypopygium similar to *edwardsi* in dorsal aspect, but anal point more angularly bent in side view.

Female. Very similar to male, anterior knees less dark than others in some specimens, transverse wing markings expanded in anal cell, antennal segments 3–5 with well-formed necks.

Holotype male in Lund University Collection.

DISTRIBUTION. SUDAN : 2 ♀, Amadi, vii.1954 (*E. T. M. Reid*). S. RHODESIA : 1 ♀, Salisbury, iii.1956 (*E. T. M. Reid*). TRANSVAAL : Holotype and paratype, Kruger Nat. Park, Skukuza, iv.1951 (*P. Brinck*). NATAL : 1 ♀, Howick, ix.1953 (*G. H. Satchell*). CAPE PROVINCE : 1 ♂, Betty's Bay, iii.1955 (*K. M. F. Scott*).

Genus *COLLARTIELLA* Goetghebuer

Collartiella Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 457.

Palpi reduced and with only two segments which are short and almost rounded ; antennae of male with 14 segments, of female with six. Prothorax greatly reduced, mesonotum projecting as a pointed cone beyond the head ; anterior tibia with an oval scale carrying a small spur, not unlike that of *Stenochironomus atroconus* Freeman (Text-fig. 2, *e*) ; other tibiae with combs fused and usually with two spurs, but the inner spur of the posterior tibia is sometimes absent and the two sides of the same specimen may not be the same in this respect ; pulvilli well developed. Vein R_{2+3} ending near R_1, posterior fork below cross-vein, wing clouded and with pale spots and small dark dots in the only known species. Hypopygium with long sinuous styles, appendage 1 hooked and bare apically, appendage 2 short and with long hairs, coxites deeply indented, IXth tergite conical, anal point long. Whole body hairy, hairs tending to be concentrated in tufts, especially on abdomen and femora.

This genus is known only from one species with an unusual appearance, the thorax and anterior tibial scale resembling those of *Stenochironomus*, but the hypopygium showing that the two genera are distinct. It may be separated from *Stenochironomus* by the greatly reduced palpi, by the hairy body with its hair tufts and by the male hypopygial structure.

Collartiella hirsuta Goetghebuer

Collartiella hirsuta Goetghebuer, 1936, *Rev. Zool. Bot. Afr.* **28** : 458.

Yellowish-brown or brown, thorax with mottled pruinosity, legs very hairy, wings brown or pale brown, with clear spots.

Male. Wing length 4·25 mm.

Head yellowish-brown, unusually transverse, more than twice as wide as high, frontal tubercles absent, palpi greatly reduced, face with thick tuft of hair ; antennae brown, A.R. slightly more than 1. *Thorax* yellowish-brown with rather darker mottling on stripes, postnotum and sternopleuron ; in addition to the dark mottling there is a mottling of silvery pruinosity on these areas ; acrostichal bristles pale and well-developed, dorso-centrals long, pale and irregularly triserial, extending as broad patches in the prescutellar area, each patch about 10 setae wide ; scutellum with a tuft of hair each side. *Legs* yellowish, femora with a trace of a broad brown ring after the middle ; tibiae about two-thirds as long as femora on all legs, L.R. said by Goetghebuer to be 2·2 but in my specimen it is only 1·5 ; legs clothed with long hairs, femora with hair tufts near the apex, anterior tarsus with long beard. *Wings* (Pl. 1, fig. *n* of female) pale brown with clear spots and darker dots, paler than in the females ; squama fringed, halteres dark at tips. *Abdomen* yellowish, probably pruinose as in female ; clothed with long hairs which are mostly abraded in the only male available, but from the arrangement of the pits they are probably arranged especially as upstanding tufts at the bases of some or all of the segments as in female.

Hypopygium (Text-figs. 16, *a*, *b*) as described above for the genus; the deeply indented coxite and curved and sinuous styles are very characteristic.

Female very similar to male but darker and more brown in colour, abdomen may be brown and is pruinose, wing markings much stronger, hair tufts well developed; segments 3–5 of antenna fusiform, 6 equal to 4 and 5 together.

I have seen the holotype female in Musée Royal du Congo Belge.

DISTRIBUTION. UGANDA: 1 ♂, Albert Nile, Pakwach, and 7 ♀, near Laropi, iv.1956 (*P. S. Corbet*). BELGIAN CONGO: Holotype female, Stanleyville; 1 ♀, Maka Lualaba, i.1939 (*H. J. Brédo*).

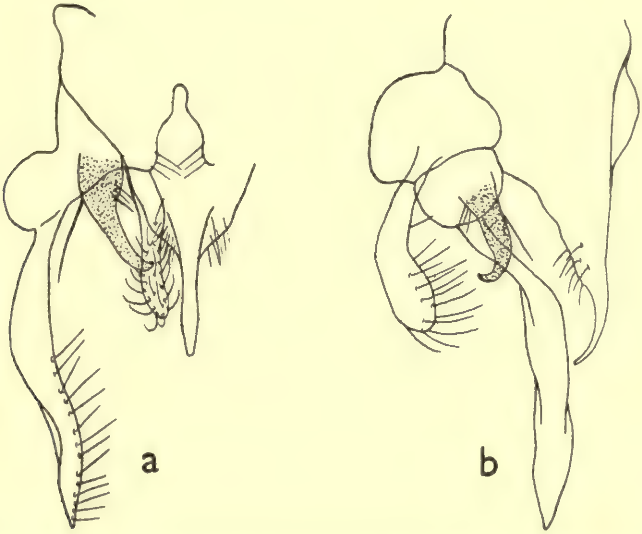

FIG. 16. Male hypopygium of *Collartiella hirsuta*. (*a*) Dorsal; (*b*) lateral.

Genus ***PARATENDIPES*** Kieffer

Paratendipes Kieffer, 1911, *Bull. Soc. Hist. nat. Metz* **27** : 41; Goetghebuer, 1937, *in* Lindner, *Fleig. Pal. Reg.* **3** (13*c*) : 66; Townes, 1945, *Amer. midl. Nat.* **34** : 27.
Kribiodoxa Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1) : 272; Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 30; Kieffer, 1925, *Bull. Soc. R. ent. Égypte*, **1924** : 296 (SYN. NOV.).
Chironomus subg. *Paratendipes* Edwards, 1929, *Trans. ent. Soc. Lond.* **77** : 395.

Male antennae with 14 segments, A.R. 1 or nearly so; female antenna with 7 segments or the two basal ones indistinctly separated, thus appearing to be 6-segmented; frontal tubercles absent, mouthparts with normal development. Pronotum reaching up to front of mesothorax, in two parts and closely applied to mesonotum; anterior tibiae usually with a short straight spur (Text-fig. 2, *f*) scale not produced, but in one African species the spur is absent; posterior tibia with two well-developed spurs, combs sometimes fused; pulvilli absent or very small. Wings bare, squama bare or fringed. Male hypopygium with style slightly curved and oval, appendage 1 in most species broad and hooked outwardly at the tip, appendage 2 short but fully developed, appendage 2*a* present.

Paratendipes is a fairly well-defined group, easily distinguished from most other genera by the absence of pulvilli, comparatively large pronotum and presence of anterior tibial spur. *Nilomyia* (= *Kribioxenus auctt. nec* Kieffer) is very similar but the male hypopygium and antennae are peculiar and these characters taken in conjunction with the more reduced prothorax makes it convenient to treat it as a separate genus. The male genitalia of *Paratendipes* are of a characteristic appearance and afford some link with *Tanytarsus* as does the bare squama of some species. *P. seydeli* sp. n. lacks an anterior tibial spur and appendage 1 is not hooked outwardly ; this species seems in some ways to be intermediate between *Paratendipes* and *Chironomus*. *Paratendipes* can thus be seen to occupy a position intermediate between the two tribes of the subfamily.

None of the species described in *Paratendipes* from Africa by Kieffer and Goetghebuer really belongs to this genus. *P. tavetanus* Kieffer is a species of *Polypedilum* ; *P. pictus* Goetghebuer is a synonym of *Chironomus* (*Dicrotendipes*) *cordatus* Kieffer ; and *P. violaceus* Goetghebuer is a species with a single spur belonging to *Lauterborniella* and which I am treating in Part IV of this study. *Kribiodoxa stictoptera* Kieffer seems to belong to *Paratendipes* and so does *K. striata* Kieffer. I can see no good reason for maintaining *Kribiodoxa* as a distinct genus or subgenus because the characters on which it was based, of the presence of wing markings and 6-segmented female antennae are too indefinite.

KEY TO AFRICAN SPECIES OF *Paratendipes*

1. Wings quite plain and unmarked 2
   Wings with clouds or dark spots 3
2. Anterior tibia with spur, tibia about as long as femur, legs with dark markings at apices of femora and anterior tibia . . . . . . *crosskeyi* Freeman
   Anterior tibiae without spur and hardly more than half length of femur, legs without distinct dark markings . . . . *seydeli* sp. n.
3. Wings with strong black markings as in Pl. 1, fig. *o*, base of cell R_5 clear . *reidi* sp. n.
   Wings either with feeble markings or with a spot occupying base of cell R_5 . . 4
4. Wings with definite spots, one in base of cell R_5 5
   Wing markings less definite, mostly as seams along veins (Pl. 1, fig. *p*), squama fringed . . . . *striata* Kieffer
5. Anal cell well clouded, posterior fork with large spot (Pl. 1, fig. *q*), squama bare *nubilipennis* sp. n.
   Anal cell clear except at apex, fork cell with small spot, squama not known *stictoptera* Kieffer

Paratendipes crosskeyi Freeman

Paratendipes crosskeyi Freeman, 1956, *Bull. I.F.A.N.* **18** : 96.

Further material of this species shows it to be more variable than was originally thought. It is a small brown or reddish-brown species, thorax more or less shining, sometimes slightly pruinose ; anterior tibia with a straight spur, legs usually with apical third of femora black, tibiae white, apex of anterior one black, L.R. 1–1·3.

It is very similar to *P. albimanus* Meigen and to *P. nudisquama* Edwards, both from the Palaearctic Region, in hypopygial structure but the colour pattern is different.

Male. Wing length 1–1·3 mm.

Head brown or yellowish-brown, palpi dark brown, pedicel may be yellowish, A.R. 1·0. *Thorax* of most specimens reddish and shining with very little pruinosity and stripes barely distinguishable; in type series thorax darker, stripes brown, and with a good deal of pruinosity along the hair lines; scutellum and postnotum dark brown. *Legs* yellowish, femora with apical third blackish or at any rate darkened; tibiae in most specimens white, but sometimes yellow or even brown, anterior tibia with extreme base and apical third black or darkened, other tibiae, sometimes with a trace of this pattern; tarsi plain; anterior tibial spur straight (Text-fig. 2, *f*), L.R. varying from 1 to 1·4; posterior tibiae with combs fused and spurs short. *Wings* without markings although there is some iridescence at the cross-vein and base of fork cell; posterior fork well distal to cross-vein, squama bare; halteres white. *Abdomen* black, sometimes more or less pruinose at the incisures; hypopygium (Text-fig. 17, *a*) almost indistinguishable from that of the Palaearctic species *P. nudisquama* Edwards; styles yellowish and curved, appendage 1 broad and with an outwardly turned hook at apex, appendage 2 short, *2a* with a narrow brush; anal point narrow.

Female resembles male but perhaps darker, cerci yellow. Antennae with seven segments, 7 equal to 5 and 6 together.

Holotype male in British Museum.

DISTRIBUTION. SIERRA LEONE: 1 ♂, Pepel, i.1956 (*D. J. Lewis*). FRENCH WEST AFRICA: 3 ♂ paratypes, Niger, Aïr, Baguezans, Irabellaben. NIGERIA: holotype male, Abuja, xii.1954. SUDAN: 1 ♂, Yirol, xii.1954 (*E. T. M. Reid*); 7 ♂, 8 ♀, Liednum nr. Wau, iii–iv.1955 (*E. T. M. Reid*). BELGIAN CONGO: 2 ♂, 1 ♀, Elisabethville (*H. J. Brédo*). S. RHODESIA: 1 ♂, Salisbury, v.1956 (*E. T. M. Reid*).

Paratendipes reidi sp. n.

A small dark species not unlike *crosskeyi* in leg colour and with similar hypopygium; easily distinguished from it and other species by the black marked wings in which the base of cell R_5 is clear.

Male. Wing length 1·3 mm.

Head, mouthparts and antennae dark brown, A.R. 0·8. *Thorax* brown, moderately shining and not pruinose, mesonotal stripes, scutellum, postnotum and sternopleuron black. *Legs* with dark femora, which are paler basally; anterior tibia whitish, basal and apical quarters black, other tibiae yellowish and more narrowly dark at base and apex; tarsi yellow; anterior tibia with curved spur, combs of other tibiae fused and with two short spurs; anterior tarsi broken. *Wings* (Pl. 1, fig. *o*) with distinctive black markings, more or less forming two bands, base of cell R_5 clear, no spot in apex of fork cell, squama bare; halteres white. *Abdomen* black; hypopygium with whitish styles, similar in structure to *crosskeyi*.

Female similar to male, perhaps rather darker, antennae broken.

Holotype male and 2 ♂, 1 ♀ paratypes, S. RHODESIA: Salisbury, v.1956 (*E. T. M. Reid*) all in the British Museum.

Paratendipes nubilipennis sp. n.

Blackish, legs without distinct markings, hypopygium very similar to *crosskeyi*; easily separated from other African species by the extensive dark markings on the wings; posterior fork cell with a large spot, anal cell with considerable darkening.

Male. Wing length 1·3 mm.

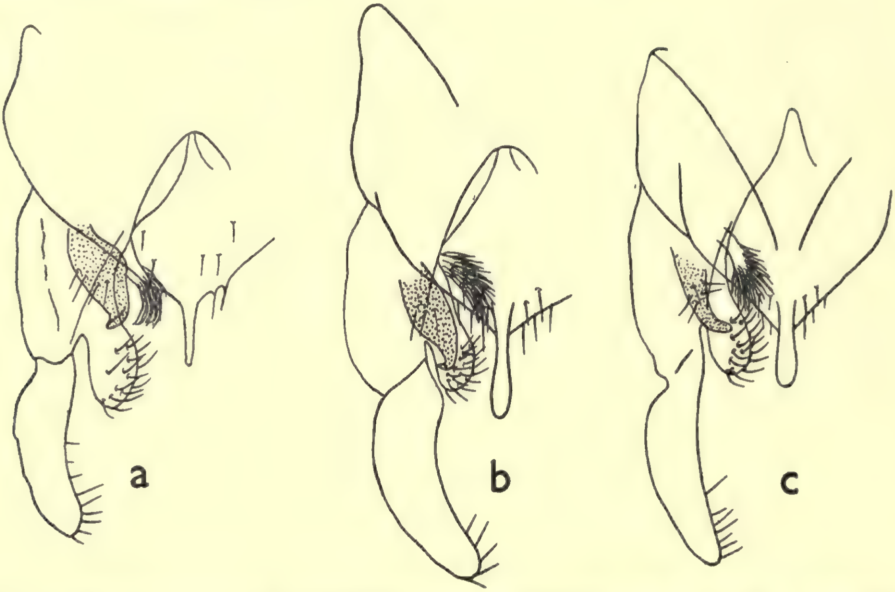

FIG. 17. Male hypopygia of *Paratendipes*. (*a*) *P. crosskeyi*; (*b*) *P. striata*; (*c*) *P. seydeli*.

Head, mouthparts and antennal pedicel dark brown, scape broken. *Thorax* very dark brown, hardly shining, slightly pruinose; stripes and postnotum black. *Legs* pale brown, anterior femur and apices of others dark brown or blackish, anterior tibial spur straight, combs of posterior tibiae fused and with two short spurs, L.R. 1·5. *Wings* (Pl. 1, fig. *q* of female) with grey markings over most of the surface; anal cell heavily marked, posterior fork cell with a large spot, base of R_5 with clouding which is continued basally; the large spot in the centre of cell R_5 is continued over vein M_{1+2} into cell M_2; squama bare, halteres pale. *Abdomen* dark brown; hypopygium very similar to *crosskeyi*, appendage 1 perhaps slightly narrower and more hooked.

Female darker than male, antennae with 6 segments only, segment 2 being formed of two more or less fused segments; 3–5 oval, 6 rather shorter than 4 and 5 together.

Holotype male NIGERIA: Alizaga, i.1955 (*R. W. Crosskey*). Paratypes, NIGERIA: 1 ♀, Niger Prov., Abuja, xii.1954 (*R. W. Crosskey*). N. RHODESIA: 1 ♀, Chilanga, i.1914 (*R. C. Wood*). S. RHODESIA: 1 ♀, Salisbury, v.1956 (*E. T. M. Reid*).

Paratendipes stictoptera Kieffer

Kribiodoxa stictoptera Kieffer, 1922, *Ann. Soc. ent. France,* **91** : 49.

I have seen no specimens which fit Kieffer's description of this species precisely, but the presence of an anterior tibial spur, the reduction of the pulvilli and the shape of the male styles make it virtually certain that the species belongs to *Paratendipes.* The female antenna is 6-segmented, but that in itself is not sufficient for generic separation. Little reliance can be placed on the figure of the male genitalia which seems to be semi-diagrammatic, except for the style shape ; the figure suggests that appendage 1 is broad and it is probable that the genitalia resemble those of *crosskeyi.* It can be distinguished from *reidi* and *nubilipennis* by the absence of markings in the anal cell and cell M_2 and it is possibly similar to *striata,* but wing markings suggest it is different. The following are the important features extracted from the original description.

Length of male 4 mm., of female 3 mm. Brownish-yellow with thoracic markings brown-black ; abdomen brown-black, hypopygium white ; halteres brown ; legs white, apices of tarsal segments and distal halves of segments 3–4 of anterior tarsi black ; all femora except the apices, middle tibiae except the base, and a ring in the middle of the posterior tibiae brownish ; anterior tibia a little shorter than femur, L.R. 1·6. *Wings* with six feeble grey spots, of which three are in cell R_5, the first filling the basal quarter, the second square and a little beyond the middle, the third small, at the extremity and confluent with a fourth small one at the extremity of cell M_2 ; the fifth spot is small and is in the posterior fork cell beneath the extremity of vein M_{3+4} ; sixth in the form of a tract bordering each side of Cu_1 and prolonged basally along the wing margin.

Type series probably lost, locality FRENCH CAMEROONS : Kribi.

Paratendipes striata Kieffer

Kribiodoxa striata Kieffer, 1925, *Bull. Soc. R. ent. Égypte,* **1924** : 294.

Rather larger than *crosskeyi* ; darker and thorax with grey pruinosity. Wing markings vague and more in the form of seams along veins except for clouds in middle and at apex of cell R_5. It seems quite similar to *stictoptera* but the wing markings do not agree, in particular there is no spot at the apex of the posterior fork cell.

Male. Wing length 1·5–2·0 mm.

Head and mouthparts dark brown, pedicel grey pruinose, A.R. about 1. *Thorax* dark brown, mesonotal stripes black, whole thorax with grey pruinosity. *Legs* yellowish, femora dark brown, paler at base and apex, four posterior tibiae each with a broad dark ring in basal half, apices of tarsal segments of posterior legs darkened, anterior tarsi broken ; anterior tibia with a short straight spur, posterior tibial combs fused but not as completely as in *crosskeyi,* with two spurs. *Wings* (Pl. 1, fig. *p*) with vague clouding in form of seams along the veins, cell R_5 with a faint quadrate spot near the centre and a smaller more rounded one below the apex of R_{4+5} ; squama fringed, halteres brown. *Abdomen* black or very dark brown ; hypopygium (Text-fig. 17, *b*) paler and very similar to that of *crosskeyi,* but styles more strongly bent, anal point wider, appendage 1 narrower at apex, *2a* more bushy.

Female not known to me, but from Kieffer's description quite similar to male; antennae 6-segmented, 6 twice as long as 5.

Holotype female probably lost, locality EGYPT: Maadi.

DISTRIBUTION. SUDAN: 11 ♂, Khartoum, x.1951 and i–ii.1952 (*D. J. Lewis*).

Paratendipes seydeli sp. n.

Thorax yellowish-brown, stripes, especially lateral ones brown, pleura with a partial dark stripe, abdomen dark brown, wings unmarked, legs yellowish, anterior pair partially dark; anterior tibiae not more than two-thirds length of femur, without spur, L.R. 2; male hypopygium with appendage 1 curved inwards.

In some respects this species is to be considered as intermediate between *Paratendipes* and *Chironomus*, but on balance its characters are more like the former than the latter and I propose to consider it a slightly anomalous species of this genus.

Male. Wing length 2–2·3 mm.

Head, mouthparts and antennae yellowish-brown, eyes nearly touching on the vertex, A.R. 1·3. *Thorax* yellowish-brown, mesonotal stripes brown or dark brown, lateral ones the darker, postnotum dark brown, pleura with a dark stripe running from the prothorax to the centre of the pleura. *Legs* yellowish, all femora brownish on apical half, anterior tibiae and tarsi brown; anterior tibia without spur, not more than two-thirds length of femur, L.R. 2; posterior four tibiae with well-developed combs each bearing a strong spur (in the holotype the middle tibiae have three spurs, but this is an aberration). *Wings* unmarked, fork longer than in *crosskeyi*, only slightly distal to cross-vein; squama bare, halteres pale. *Abdomen* dark brown; hypopygium (Text-fig. 17, *c*) brown, anal point wider than in *crosskeyi*, styles curved, appendage 1 curved inwardly, *2a* bushy.

Female similar to male, antennae with 6 segments, 3–5 with short necks, 6 one and a half times as long as 5.

Holotype male BELGIAN CONGO: Elisabethville, xii.1932 (*C. Seydel*). Paratypes, SUDAN: 2 ♀, Melut, xi.1953 (*E. T. M. Reid*). BELGIAN CONGO: 3 ♂, 1 ♀, Elisabethville (*H. J. Brédo*). TRANSVAAL: 1 ♂, 1 ♀, Kruger Nat. Park, Skukuza, v.1955 (*A. D. Harrison*). Three paratypes returned to Institut Royal des Sciences Naturelles de Belgique, holotype and remainder of series in British Museum.

Genus ***NILOTHAUMA*** Kieffer

Nilothauma Kieffer, 1921, *Ann. Soc. sci. Brux.* **40** (1): 270; Kieffer, 1921, *Ann. Soc. ent. France,* **90**: 27 and 37.

Kribioxenus Goetghebuer, 1928, *Faune de France* **18** (3): 18 (not Kieffer, 1921, *Ann. Soc. ent. France,* **90**: 29); Edwards, 1929, *Trans. ent. Soc. Lond.* **77**: 396 (as subg. of *Chironomus*); Townes, 1945, *Amer. midl. Nat.* **34**: 34.

Male antenna with 14 segments, last segment not elongate, only about as long as previous three together, plumes shorter than usual; female antenna with 7 segments; frontal tubercles absent. Pronotum reduced, not visible from above;

wings without macrotrichia on the membrane, squama bare, posterior fork well beyond r-m. Anterior tibia with a long curved spur (Text-fig. 2, *g*), posterior tibial combs poorly formed, each with a short spur, middle tibial combs apparently with only one spur ; pulvilli absent. Ninth tergite of male with one or two median horn-like processes, anal point usually broad, appendage 2*a* absent.

Although the species of this genus resemble *Paratendipes* in some respects, the peculiar male antennae and ninth tergite taken in conjunction with the spur structure and the greater reduction of pronotum suggest that they are best treated as a separate genus.

Goetghebuer thought that there was only one spur on the posterior tibia of the Palaearctic species *brayi* Goetghebuer, and, using Kieffer's key (1921), he placed it in the genus *Kribioxenus*. Edwards (1929) pointed out the presence of a second spur, but instead of transferring the species to another genus, he re-defined *Kribioxenus*! This re-definition has been accepted by Goetghebuer (1937) and Townes (1945) but is quite invalid as it does not allow the originally included species to remain in the genus.

Kieffer's description of *Kribioxenus* states that the anterior tibia has a short setiform spur and that the smaller of the posterior tibial combs has a long and slightly curved spur whilst the larger is unarmed ; in addition the antennal ratio is 0·6. It is clear from this that the Palaearctic and Nearctic species previously placed in *Kribioxenus* cannot possibly be placed in that genus.

The African species described below is extremely similar, structurally, to " *Kribioxenus* " *brayi* Goetghebuer, differing in the presence of wing markings and it seems obvious that they belong to the same genus. Using Kieffer's (1921) key to the genera, the African species is identified without a great deal of difficulty as *Nilothauma pictipenne* Kieffer, which means that *Kribioxenus auctt. nec* Kieffer should be called *Nilothauma* Kieffer. Goetghebuer's original mistake was partially caused by Kieffer overlooking the presence of spurs on the posterior tibiae ; this is understandable as they are so small.

Nilothauma pictipenne Kieffer

Nilothauma pictipenne Kieffer, 1921, *Ann. Soc. ent. France*, **90** : 37.

A small species with yellowish thorax and reddish mesonotal stripes ; abdomen dark, wings with pattern of dark spots, femora with preapical dark ring, male hypopygium with broad anal point and two tergal processes.

Male. Wing length 1·0 mm.

Head yellowish, palpi darker, antennae (Text-fig. 18, *a*) typical for the genus, with 14 segments, the last segment hardly as long as the preceding three segments together and narrower apically, plumes scanty and short. *Thorax* yellow and with some pruinosity ; mesonotal stripes and sternopleuron reddish-brown, scutellum and postnotum dark brown, pleura with a horizontal dark brown stripe. *Legs* pale yellow, femora with a subapical brown band, anterior tibia dark on apical half or third ; L.R. 1·25, pulvilli absent ; anterior tibia with a long curved spine (Text-fig. 2, *g*), posterior tibiae with combs poorly formed and each with a short, spur which is not easily seen, middle tibiae appear to have only one spur. *Wings* with dark markings as in Pl. 1, fig. *r* of female, posterior fork wide and distal to cross-vein, squama bare. *Abdomen* dark greenish-brown, hypopygium (Text-figs. 18, *b*, *c*) pale; styles pointed, appendage 1 short and with two lobes, appendage 2 curved, with about 5–6 apical hairs; anal point very broad, IXth tergite with two dorsal processes, the more basal composed of basally fused hairs, the other darker and triangular.

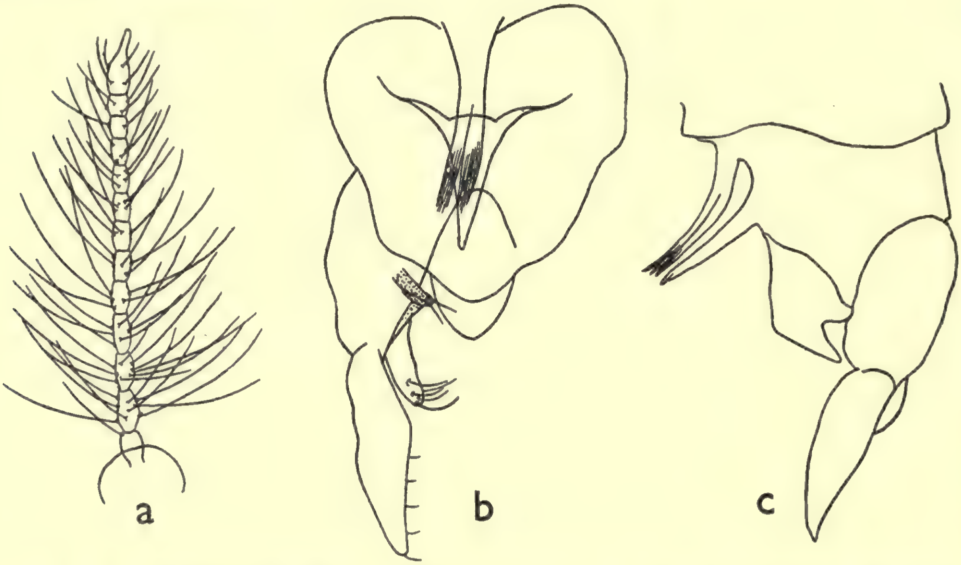

FIG. 18. *Nilothauma pictipenne.* (a) Male antenna; (*b*) male hypopygium, dorsal and slightly flattened; (*c*) male hypopygium, lateral and in natural position.

Female similar to male, antennae with 7 segments, 2–6 oval, 7 as long as 4–6 together.

Holotype male probably lost, locality SUDAN: Mongola, White Nile.

DISTRIBUTION. SUDAN: Khartoum, series of both sexes at light, x.1951, xii.1951 and ii.1952 (*D. J. Lewis*).

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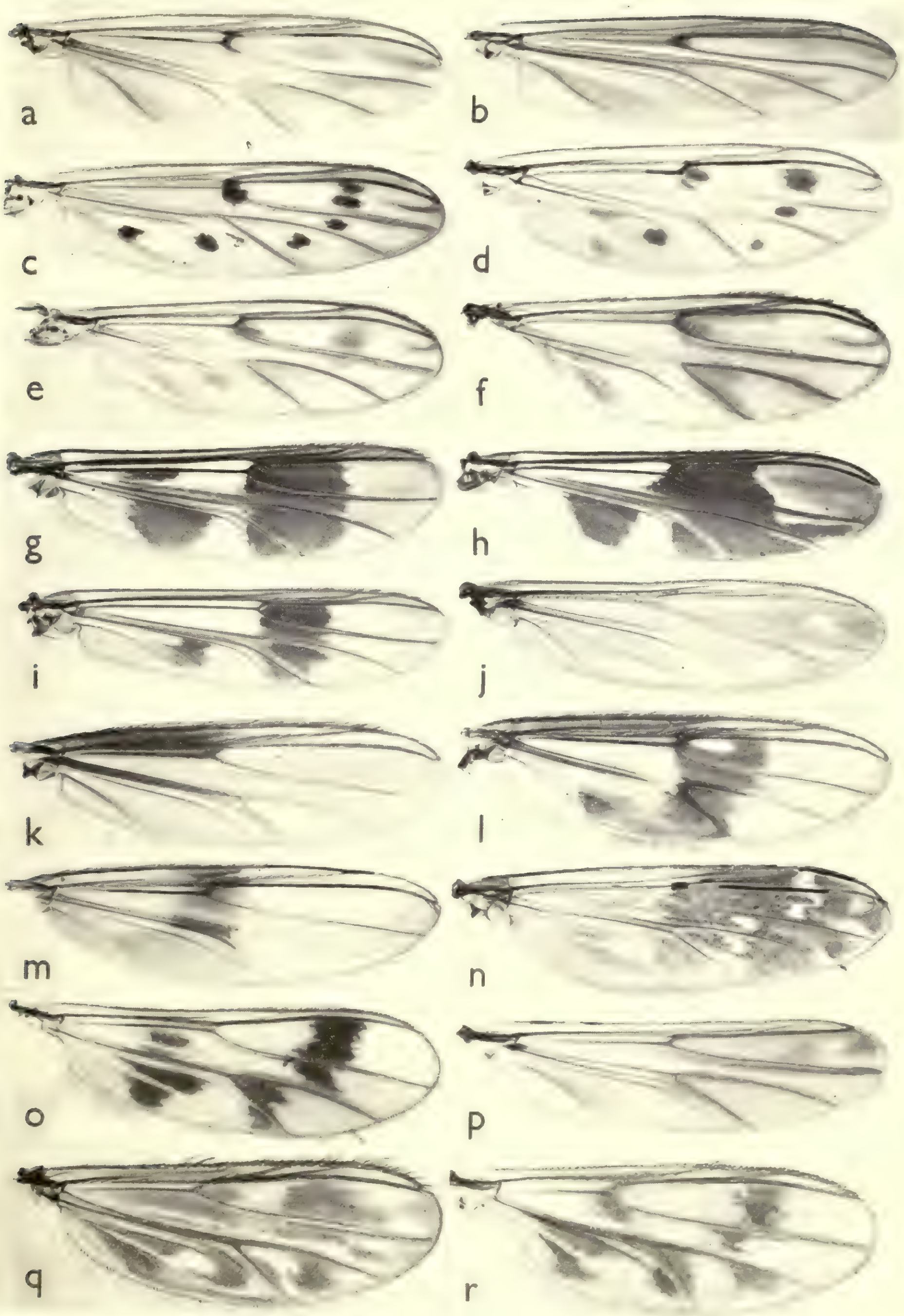
PLATE 1

Wings of Chironomidae. (*a*)*Chironomus* (*Chironomus*) *calipterus* ; (*b*) *C.* (*C.*) *formosipennis* ; (*c*) *C.* (*Dicrotendipes*) *pilosimanus* ; (*d*) *C.* (*D.*) *fusconotatus* ; (*e*) *C.* (*D.*) *peringueyanus* ; (*f*) *C.* (*D.*) *sudanicus* ; (*g*) *C.* (*D.*) *cordatus*, male ; (*h*) *C.* (*D.*) *cordatus*, female ; (*i*) *C.* (*D.*) *collarti* ; (*j*) *Nilodosis fusca* ; (*k*) *Stenochironomus albicoxa* ; (*l*) *S. edwardsi* ; (*m*) *S. pustulatus* ; (*n*) *Collartiella hirsuta* ; (*o*) *Paratendipes reidi* ; (*p*) *P. striata* ; (*q*) *P. nubilipennis* ; (*r*) *Nilothauma pictipenne.*

PLATE 1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